

THE IRON AGE

Seventy-fifth Year

OCTOBER 2, 1930

West Virginia Geological Survey
Morgantown, W. Va.



HY-TEN

SPECIAL STEELS

THE RESULT

of a quarter century of successful metallurgical
research and practical development toward
analyses combining—

- (1) *Excellent Physical Properties*
- (2) *Free Machining Qualities*

IMMEDIATE DELIVERY

Carbons	.10 — 1.00
Sizes	$\frac{1}{4}$ " — 10"

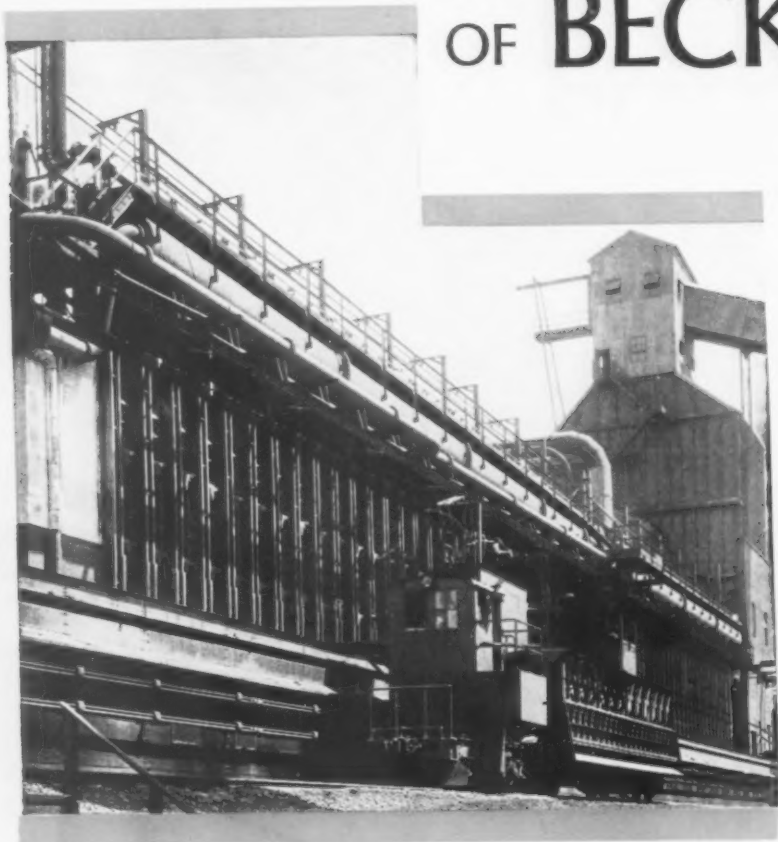
"Pertinent Points" bulletins
contain the facts
Write for them.

WHEELOCK, LOVEJOY & Co., Inc.

128 SIDNEY ST., CAMBRIDGE A, MASS.

CAMBRIDGE: NEW YORK: CLEVELAND: CHICAGO

PROGRESSIVE —A DISTINCTIVE FEATURE OF BECKER OVENS



Whether in the design of equipment or in laying out a plant to derive the maximum advantage from a market situation, progress is a matter of course with Koppers. Every new plant involves the assembly of economic and technical factors into a correct, individual pattern.

Koppers has built 75% of American by-product capacity and operates for its own account plants carbonizing over 7,000,000 tons of coal per year. Its experience enables it to realize for its customers the full advantage of coke and gas production in Becker ovens.

"Becker Oven Plants assure economical coke and gas production."

KOPPERS CONSTRUCTION COMPANY

KOPPERS BUILDING PITTSBURGH

ELEPHANT BRAND

"Phosphor Bronze"
REG. U.S. PAT. OFF.

USED by firms that are critical of results, for bushings, bearings, gears, valves, cylinder linings, rods, bolts, propellers, marine hardware, etc., because it offers exclusive qualities and advantages.

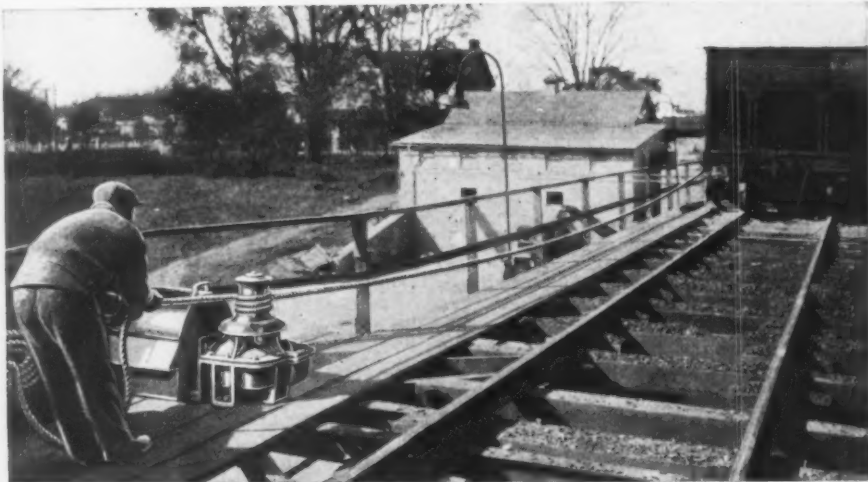
Available in ingots, castings, rods, wire, sheets, ropes, tubes.

Let us explain the uses of the various grades.



THE PHOSPHOR BRONZE SMELTING CO.
2200 WASHINGTON AVENUE, PHILADELPHIA, PA.

How Do You Spot R. R. Cars?



Here's the quick, profitable way

IT COSTS real money every time a gang of men is kept waiting for the loading or unloading of cars.

Check up in your own plant; notice how inability to move a car to or from a siding interferes with the efficient movement of materials both inside and outside the plant. Estimate the *cost* of such delays over a period of a year, of five years, and you have the reason for the growing use of Caldwell Electric Car Spotters throughout industry.

Pulling in any direction, a Caldwell Car Spotter moves from one to six cars. It may also be used for moving heavy bulky objects when necessary. Always ready, there's no need to wait for the switch engine, or to resort to slow, dangerous hand methods. Priced exceptionally low, due to simplicity of design and use of standardized parts. Write for Bulletin 992 which gives full details.

H. W. CALDWELL & SON CO.

DIVISION, LINK-BELT COMPANY

C-144

CHICAGO: 2110 West 18th Street

New York: 2676 Woolworth Bldg.

Dallas: 1101 Mercantile Bank Bldg.

CALDWELL

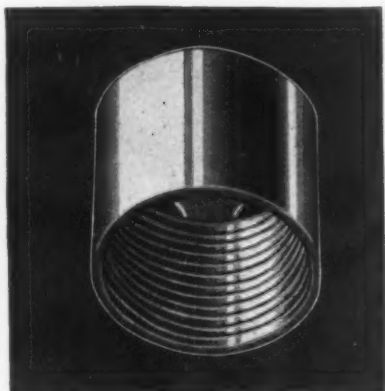
Atlanta 511 Haas-Howell Bldg.
Baltimore, Md. 913 Lexington Bldg.
Birmingham 229 Brown-Marr Bldg.
Boston 1103-4 Statler Bldg.
Buffalo 554 Killicott Square
Cleveland 527 Rockefeller Bldg.
Denver 521 Boston Bldg.
Detroit 5938 Linndale Ave.
Grand Rapids 533-4 Michigan Trust Bldg.

Indianapolis 200 S. Belmont Ave.
Kansas City, Mo., N. 436, 1062 Baltimore Ave.
Los Angeles 361-363 S. Anderson St.
Louisville, Ky. 349 Starke Bldg.
Milwaukee R. 1409, 425 E. Water St.
Montreal Insurance Exchange Bldg.
New Orleans 619 N. Peters St.
Oakland, Calif. 526 Third Street

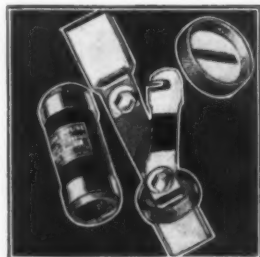
Philadelphia 2045 W. Hunting Park Ave.
Pittsburgh N. 2125, 436 Seventh Ave.
Portland, Ore. 67 Front Street
San Francisco 496 Paul Avenue
Seattle 820 First Ave. S.
St. Louis 3638 Olive Street
Toronto Eastern Ave. & Leslie St.
Vancouver Standard Bank Building
Wilkes-Barre 826 Second Nat'l Bank Bldg.

CONVEYORS - - ELEVATORS - - POWER TRANSMISSION EQUIPMENT

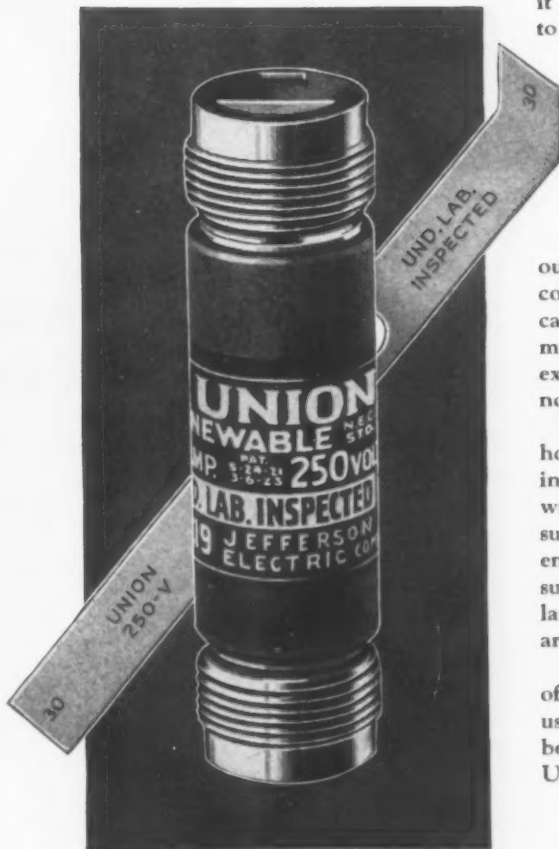
GREATER SIMPLICITY... FEWER PARTS...
Quicker, Easier Renewals are Features of the New



Caps are one piece, insuring positive contact with the clips.



The knife-blade type Union Renewable Fuse also has an exclusive system of venting, few parts, substantial construction—and a link notched at both ends to permit quick, easy renewals. These features and the rugged grey horn fibre casing are a guarantee of longer fuse life—a new fuse for the price of a link.



UNION JEFFERSON *Ferrule Type Renewable* **FUSES**

USERS who have seen the new ferrule type Union Renewable Fuse declare it the simplest, most practical, easiest fuse to renew.

Besides the link there are only three parts—two caps and the casing. And the caps have no loose washers to drop or lose. To renew, simply unscrew the caps—pull out the link, insert a new one, screw on the caps—and the fuse is ready for service.

It is designed to withstand blow-out after blow-out—reducing yearly fuse costs. Venting which relieves the pressure caused by the blowing of the link, and makes long life possible, is secured by an exclusive method—through the end caps, not the threads.

The link is held diagonally in the heavy horn fibre casing—keeping it from touching and charring the fibre, or interfering with the accuracy of the rating. The link is supplied bent at only one end. The straight end is inserted in slots and bent over, insuring correct fit automatically. Slots are large for easy cleaning and inspection and are so shaped that the link can not twist.

Jot down a sample order for use on a few of your most troublesome circuits. Actual use will prove these superiorities. We will be glad to tell you which wholesalers handle Union Renewable Fuses in your territory.

NEW HANDY FUSE WRENCH



The handiest tool for tightening and loosening ferrule type renewable fuse caps. Comfortably-sized hard wood handle, with hole in each end—one for fuses of 1 to 30 amp., 250 volt size; the other for 31 to 60 amp., 250 volt, and 1 to 30 amp., 600 volt. Your wholesaler has it.

JEFFERSON ELECTRIC COMPANY

1590 South Laflin Street, Chicago, Ill.

LIBRARY
 WEST VIRGINIA UNIVERSITY

A New Aircraft Engine . . .



Western Aircraft Engine, built by Western Enterprise Engine Co., Los Angeles, California, mounted in an Eagle Rock biplane.

With Proved and Dependable VANADIUM STEELS In Crankshafts and Other Parts

DEVELOPED by Western Enterprise Engine Company of Los Angeles—a company with many years of experience in the design and construction of gas, distillate and Diesel engines—the Western Aircraft Engine is equipped with Vanadium Steel in its two-piece crankshaft, connecting rod cluster, connecting rod master, and the six pieces which comprise the connecting rod links.

Since the pioneering trans-Atlantic flight, record after record has been made in the air with engines equipped with Vanadium Steel in vital parts. Engines that have spanned the Atlantic, the Pacific and the Poles have proved the dependability of Vanadium Steels in engine parts

where high strength, great toughness and resistance to fatigue were the vital essentials.

Perhaps your product will be better—possibly your manufacturing equipment will be more dependable and longer-serving—with stronger, tougher and more durable Vanadium Steels in important units. May we discuss the matter with you? Write us today.



FERRO-ALLOYS
of vanadium, silicon, chromium and titanium; silico-manganese, tungsten and molybdenum, produced by the Vanadium Corporation of America, are used by steel makers in the production of high-quality steels.

VANADIUM CORPORATION OF AMERICA

120 BROADWAY, NEW YORK, N. Y.
CHICAGO PITTSBURGH DETROIT
Straus Bldg. Oliver Bldg. Book Tower
Plants at
Bridgeville, Pa., and Niagara Falls, N. Y.
Research and Development Laboratories at
Bridgeville, Pa.

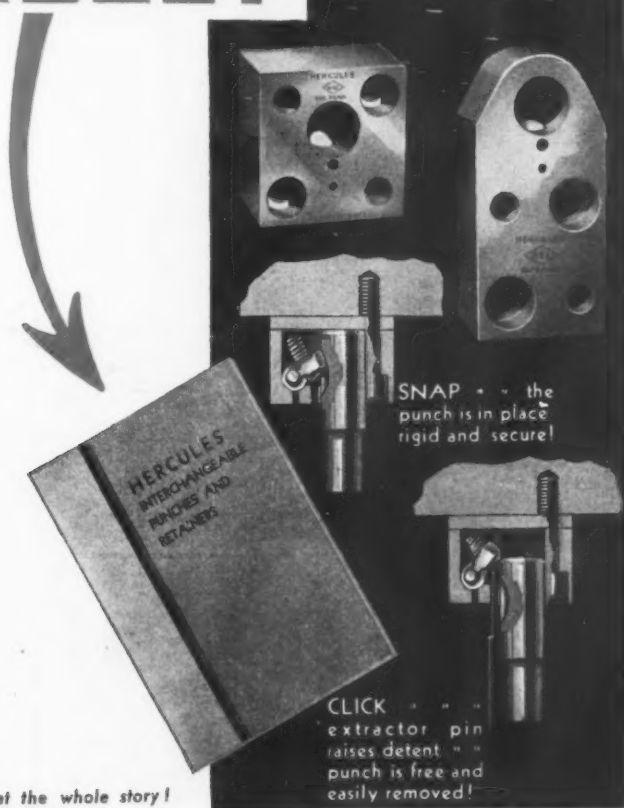
VANADIUM STEELS

for strength, toughness and durability

Profit by this *NEW IDEA* HOLDS IN PUNCHES SECURELY



RELEASES FREELY



Get the whole story!
Profit from this new
idea in punches from
the very start. If you haven't received your copy
of Catalog No. 94, write for one now.



FREELY interchangeable under all service conditions, Hercules Interchangeable Punches and Retainers make it unnecessary to hold up production and remove dies from the press to replace worn or broken punches.

Even on the heaviest work Hercules Punches remain as interchangeable as drills in a drill press. A detent with large bearing surface holds the punch secure against severest stripping strains, yet always ready for quick removal.

Hercules Punches lend themselves profitably to practically all punching operations — setting new standards of performance. Their precision, superior steel and controlled heat treatment result in a punch vastly superior to the usual product.

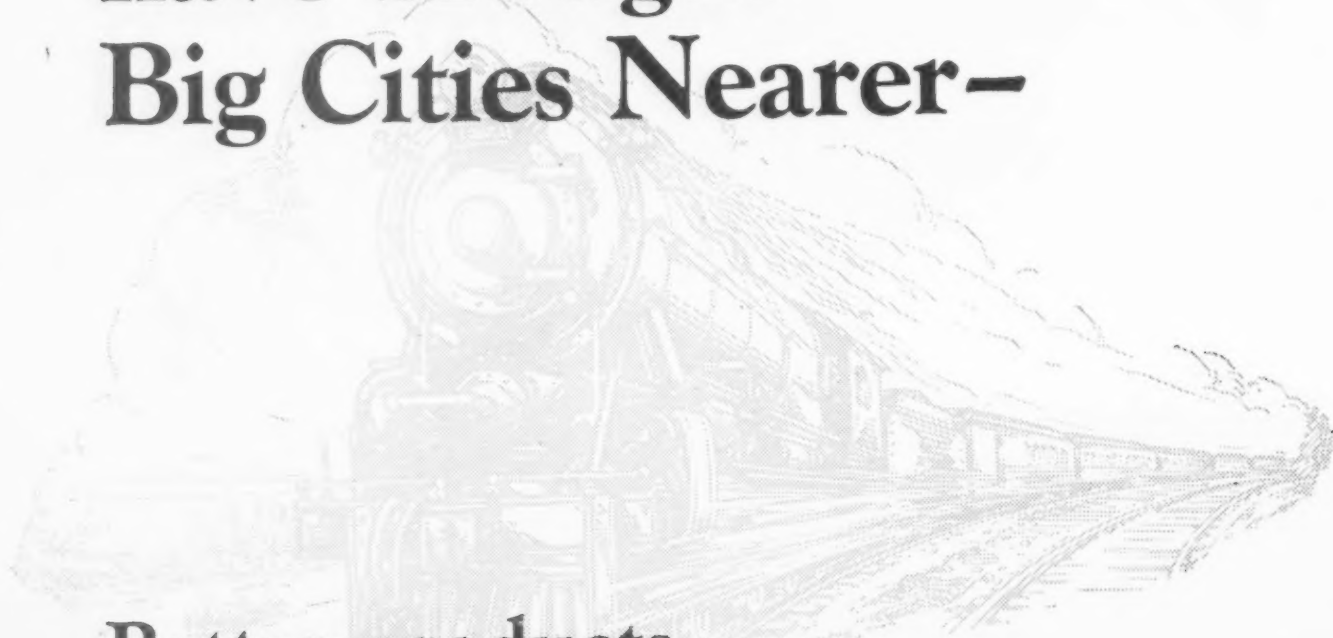
The Hercules interchangeable punch system will effect great savings over your present punching practices. Let us show you how it may be applied to your jobs and save money on your die and production costs.

WHITMAN & BARNES

NEW YORK DETROIT CHICAGO
MAKERS OF FINE TOOLS FOR 76 YEARS

HERCULES INTERCHANGEABLE PUNCHES AND RETAINERS

Great Trains have brought Big Cities Nearer—



Better products
built with—



Die Castings

are cutting down those great spaces
between initial inquiries and the
satisfaction that leads to faster sales.

THE NEWTON DIE CASTING CORPN.
146 Munson Street New Haven, Conn.

**ATTRACTIVE
PRODUCTS**
*economically pro-
duced are half the
selling battle.*

FRESH . . . AT THE END OF THE FURROW!



THE pungent odor of newly turned earth. Row on row of deep, even furrows, as far as the eye can see. At the end of the furrow stands a giant tractor . . . fresh, eager for more work . . . even after ten hours of consistent plowing! A far cry, indeed, from that classic, dismal figure of the poet . . . "The plowman homeward plods his weary way . . ."

Thank the tireless tractor for the liberation of the farmer! Thank the unending energy of this mechanical giant for today's huge crops—so important a factor in our present standard of luxurious living.

And thank alloy steels for the tractor! For ordinary steels are too fragile, too weak to withstand the punishing grind to which modern farm machinery is subjected.

Agathon Alloy Steels have solved the metal problems of many a machinery manufacturer. And Agathon Alloy Steels can solve your metal problems, too—economically, efficiently.



Republic Steel Corporation, world's largest producers of alloy metals, maintains a staff of distinguished metallurgists for your convenience. These specialists will be glad to consult with you. They'll designate a specific metal to meet your

needs; create an entirely new alloy for you, if necessary. Their services involve no obligation. A line on your letter-head will arrange a conference. Simply address: Central Alloy Steel Division, Republic Steel Corporation, Youngstown, Ohio.



REPUBLIC STEEL CORPORATION

"MOST UP-TO-DATE"

said the Operator

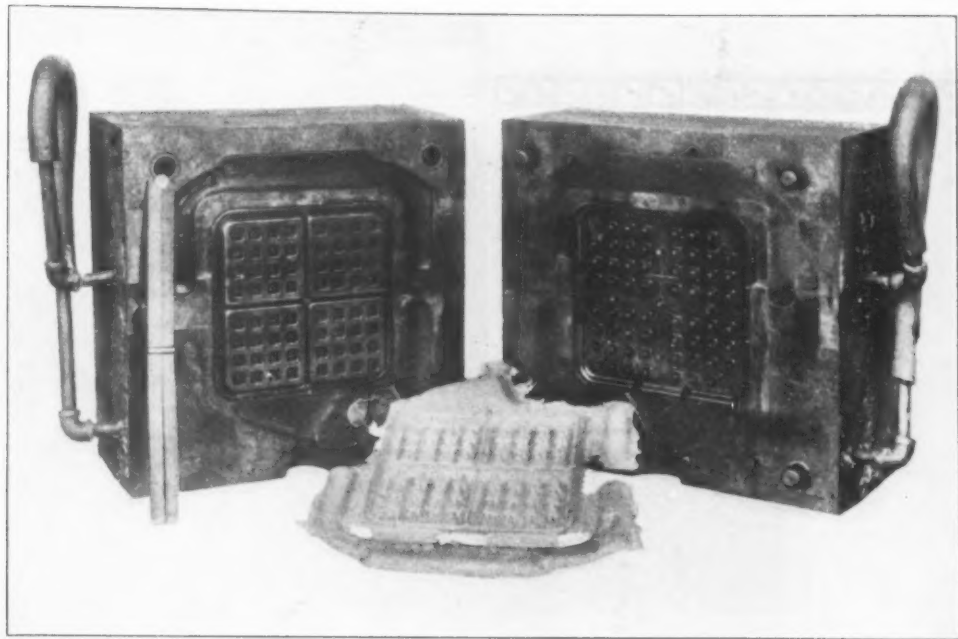


SEMET-SOLVAY ENGINEERING CORPORATION designed and built this screening station for SLOSS-SHEFFIELD STEEL AND IRON COMPANY at Birmingham, Ala. Coke can be loaded simultaneously on six tracks, permitting rapid shipment of clean, accurately-sized fuel to meet any market demand.

Semet-Solvay Engineering Corporation applies to its designing of coal gas and water gas plant fuel handling systems, the widest technical and operating experience in coke and gas production.

Your inquiries are invited, whether you need a complete new unit, or only minor changes to installed equipment.

SEMET-SOLVAY
ENGINEERING CORPORATION
Division Allied Chemical and Dye Corp.
40 RECTOR ST. NEW YORK

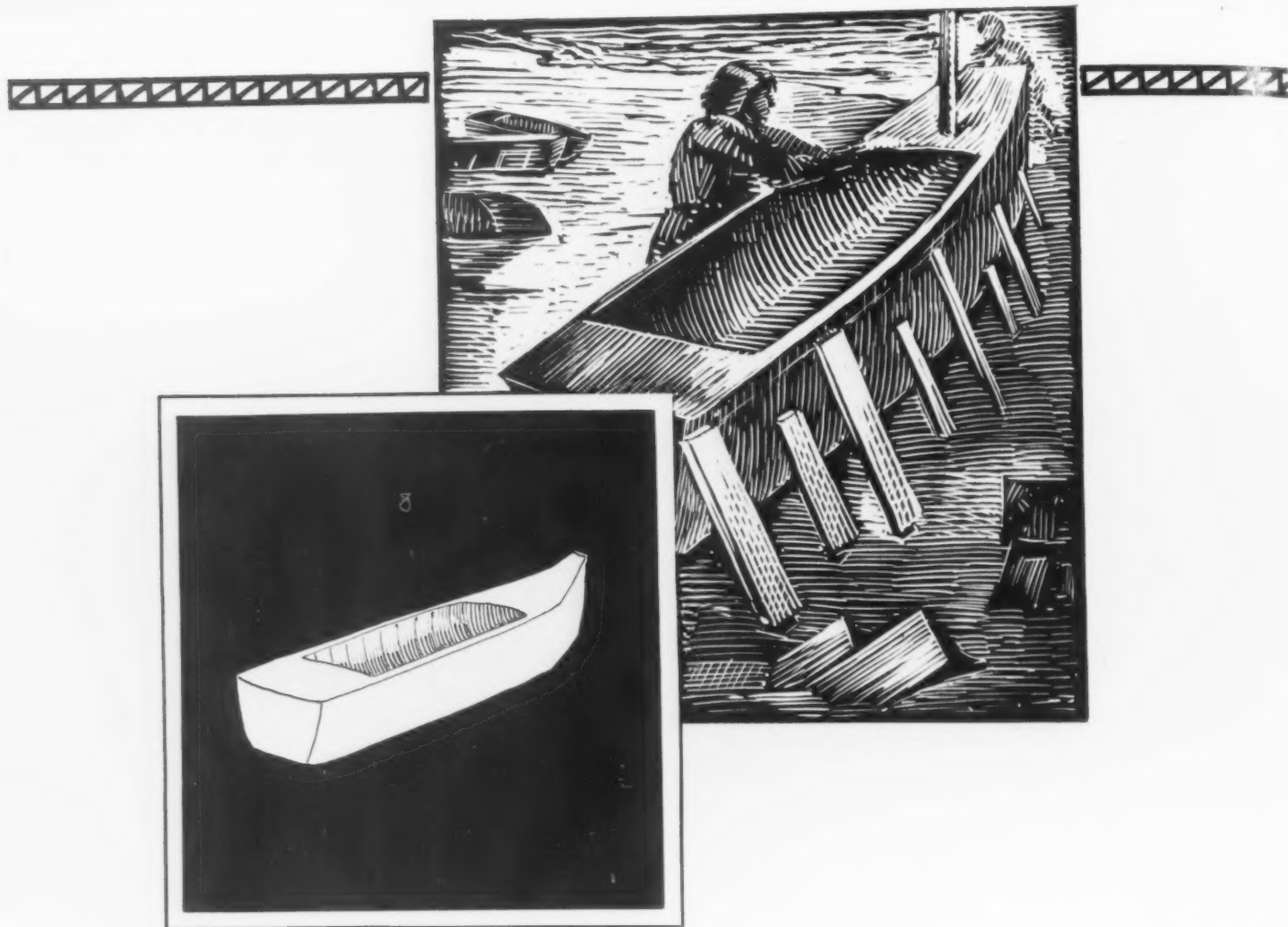


Vasco MARVEL HOT DIE STEEL

85,000 waffle-iron grids produced by this die casting die made of Vasco MARVEL at the time this photograph was taken. But this record is not top production by any means. If you use hot die steels Vanadium engineers have an interesting story to tell you about MARVEL.

**VANADIUM-
ALLOYS**
STEEL COMPANY
LATROBE, PA.





Guild Ideal of Doing One Thing Well Now

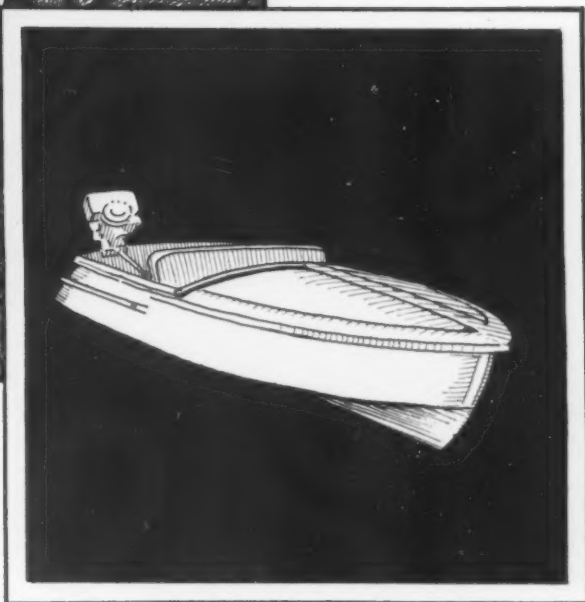
History records that early in mediaeval times it was a recognized fact that it was best to do one thing well. In 1363 craftsmen were by law required to stick to one guild. Apprentices were accepted for but one craft and were prohibited by law from following no other work excepting that to which they had been apprenticed. Thus began the idea of specialization six centuries ago. Six hundred years experience has served to emphasize the importance and worth of this idea of doing one thing well—specialization.

Black Sheets
Automobile Sheets
Metal Furniture Sheets
Ceiling Stock

Locker Stock—Regular and Special
Japanning Stock—Regular and Special
Single Pickled Sheets
Bow Socket Sheets
Milk Can Stock



EMPIRE

*Pickling*

Kept Alive by Empire Steel Specialization

Enameling Stock
 Auto License Plate Stock
 Nickel Plating Stock
 Full Pickled Sheets
 Electrical Sheets
 Copper Bearing Sheets in
 all Finishes
 "Wabik" Metal—(Special
 Vitreous Enameling Stock)

Fully realizing the advantages of specialization, Empire Steel Corporation has steadfastly refrained from the temptation to manufacture anything but the one special line. Undivided attention is devoted solely to the manufacture of steel sheets. It stands to reason that this concentration has made possible a superior product which merits your consideration.

EMPIRE STEEL CORPORATION
 Mansfield, Ohio

Sales Offices: New York-Philadelphia-Cleveland-Detroit
 Chicago, 520 No. Michigan Ave.-Indianapolis-St. Louis

Steel Sheets



SMITHWELDED



TOUGH

The ability of SMITH-Welded Line Pipe to stand rough treatment saves many minutes—minutes that quickly mount into more miles of completed pipe line.

A. O. SMITH CORPORATION
General Offices; Milwaukee, Wis.

Oil and Gas Field Products Division

District Offices at:

New York • Tulsa • Houston • Los Angeles

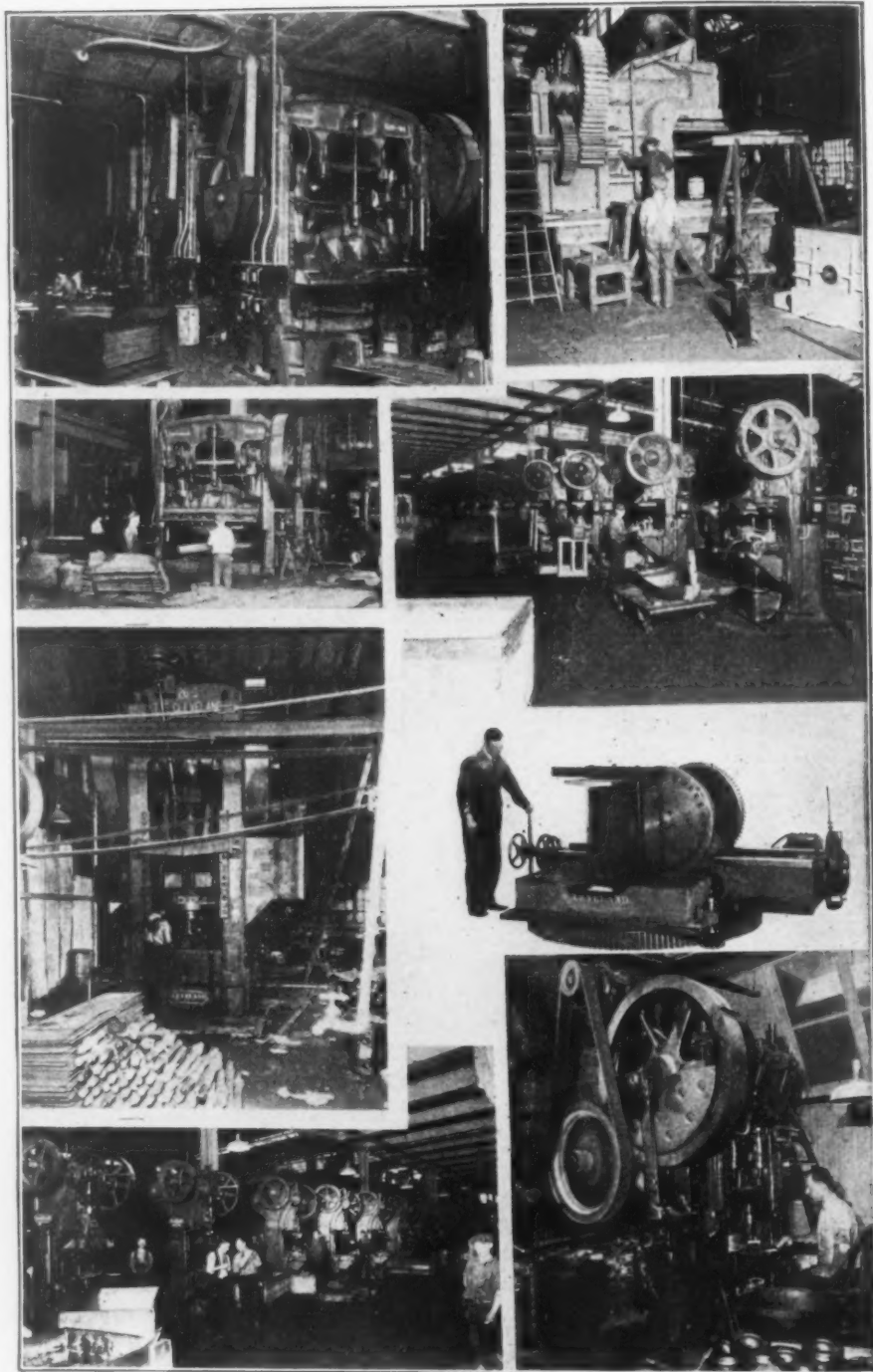
LINE PIPE

CLEVELAND

The diversity of products manufactured by us includes every type and size of Power Press from the smallest Open Back Inclined to the largest Single and Double Crank Toggle; Fabricating Tools such as Punches, Shears, Bending and Straightening Rolls, Rotary and Plate Planers, Flanging Clamps and Wall Radial Drills; Small Tools including Punches, Dies, Rivet Sets, Shear Blades, Coupling Nuts, Pistons, Chisels and Chisel Blanks.

The illustrations shown of various tools are more or less typical but they could be multiplied hundreds of times and if you are interested in any of the products listed above the probabilities are that we can refer you to some user in your particular neighborhood.

Cleveland Power Presses are being used so extensively that it is practically impossible to list many products being produced on them; however, if you have a stamping, forming, blanking, piercing or any other problem involving the use of Power Presses our engineers will be pleased to give you the benefit of their practical experience in selecting the proper press for your particular requirements.



POWER PRESSES

FROM THE SMALLEST
OPEN BACK INCLINABLE
TO THE LARGEST SINGLE
AND DOUBLE CRANK TOGGLE.

FABRICATING TOOLS

PUNCHES, SHEARS,
PLATE AND ROTARY
PLANERS, BENDING AND
STRAIGHTENING ROLLS,
WALL RADIAL DRILLS.

SMALL TOOLS

PUNCHES, DIES,
RIVET SETS, CHISELS
AND CHISEL BLANKS
SHEAR BLADES, PISTONS
COUPLING NUTS.

THE CLEVELAND PUNCH & SHEAR WORKS CO.
CLEVELAND OHIO, U.S.A.
NEW YORK — CHICAGO — DETROIT — PITTSBURGH

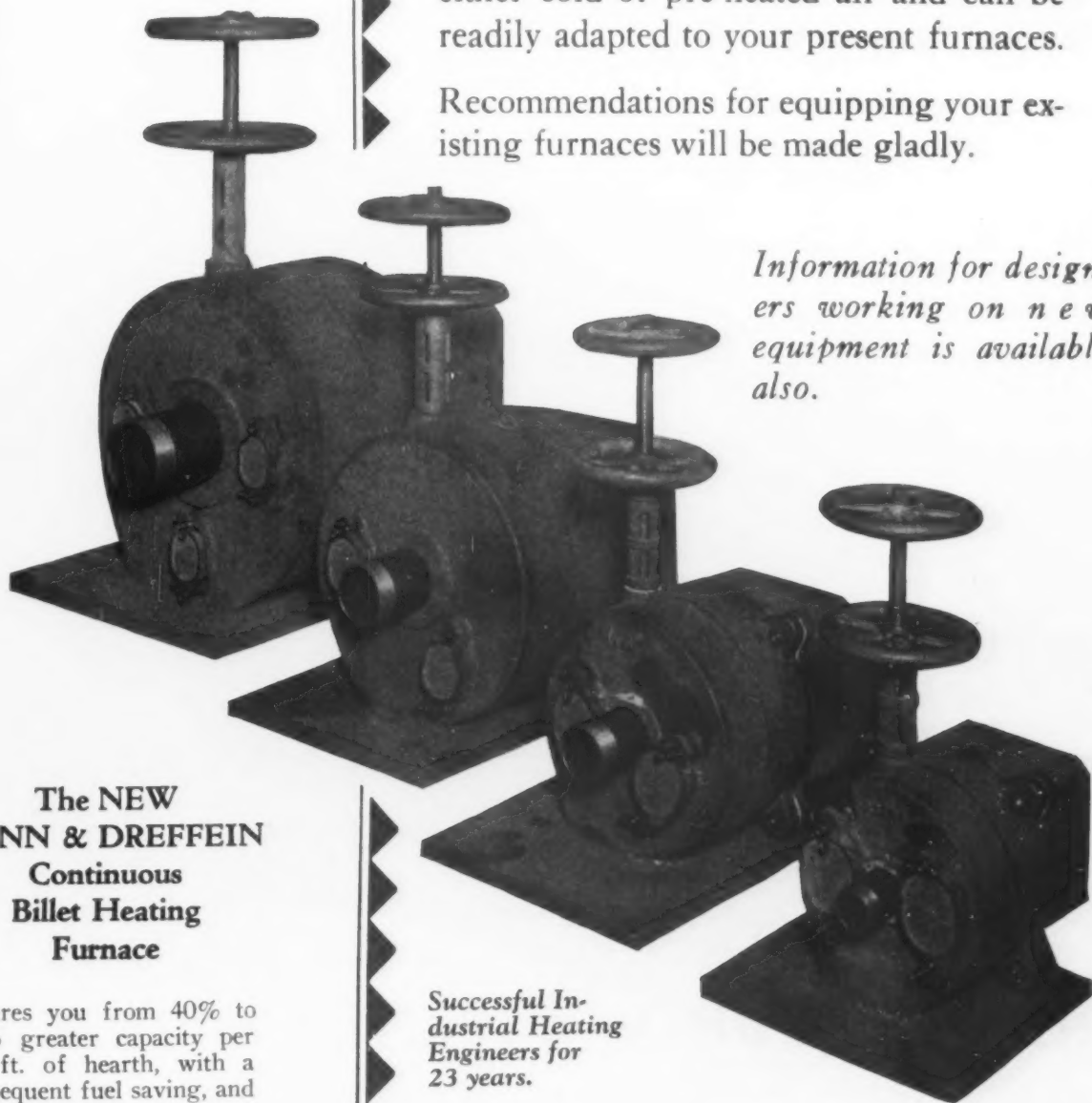
Results are guaranteed
when you use—

FLINN & DREFFEIN RAW PRODUCER GAS BURNERS

These burners are a great forward step in industrial heating economy. Besides an appreciable saving in fuel, you obtain better control of heat and a decided saving on labor charges. They are built to handle either cold or pre-heated air and can be readily adapted to your present furnaces.

Recommendations for equipping your existing furnaces will be made gladly.

Information for designers working on new equipment is available also.



The NEW FLINN & DREFFEIN Continuous Billet Heating Furnace

assures you from 40% to 60% greater capacity per sq. ft. of hearth, with a consequent fuel saving, and freedom from scaling and slagging of billets and slabs.

Let us give you the complete details.

Successful Industrial Heating Engineers for 23 years.

Flinn & Drefflein Company

308 West Washington St.

Chicago, Ill.

J&L

MAKES ALL OF THESE STEEL PRODUCTS

enabling you to obtain,
from a single reliable
source . . . steel for
practically every need

STANDARDIZE on J & L Steel. You can, because during its three-quarters of a century of experience in iron and steel making, the Jones & Laughlin Steel Corporation has constantly added new products to its line until there is, today, a J & L Product to meet practically every requirement for steel. All your operating departments will be supplied with steel of uniform quality and, in addition, you will save all the time, clerical labor and overhead expense that division of purchases among many makers entails upon your organization.

While you may order from the J & L mills at Pittsburgh and Aliquippa, Pa., for regular requirements, in emergencies you have the advantage of being able to obtain quickly, from J & L Warehouses in Chicago, Cincinnati, Detroit and Pittsburgh, J&L Steel Products of the same quality you are accustomed to receiving on mill orders.

OPEN HEARTH AND BESSEMER STEEL

HOT ROLLED PRODUCTS
 Billets Blooms Slabs Sheet Bars Skelp
 Bands Flats Hexagons
 Rounds Squares
 Angles Beams Channels Tees Zees
 Agricultural Shapes Special Shapes
 Light Weight Stair Stringer Channels
 Plates for Bridges, Tanks, Boilers, Cars and Ships

RAILROAD SPIKES TIE PLATES
 Light Rails and Accessories

BARS FOR CONCRETE REINFORCEMENT
 (Straight, Bent and Fabricated)

FORGING STEEL

JALCASE STEEL
 Hot Rolled Cold Finished

COLD FINISHED STEEL
 Rounds Squares Hexagons Flats Special Shapes
 Free Cutting Screw Stock
 Shafting (Turned and Ground, Turned and Polished,
 Cold Drawn)
 Pump and Piston Rods

JUNIOR BEAMS

STEEL PILING

FABRICATED STRUCTURAL WORK

Columns Girders Trusses
 Plate Work Tanks Steel Barges
 Mill and Factory Buildings

TUBULAR PRODUCTS

Standard Pipe Line Pipe
 Casing, Tubing, Drive and Rotary Drill Pipe
 in Lapwelded and Seamless

WIRE PRODUCTS

Wire Rods
 Bright, Annealed and Galvanized Wire
 Spring Wire Barbed Wire Woven Fencing
 Bright, Coated and Galvanized Nails
 Fence Staples Netting Staples

TIN MILL PRODUCTS

Coke Tin Plate Black Sheets (Tin Mill Sizes)

COKE BY-PRODUCTS

**J&L
STEEL**

JONES & LAUGHLIN STEEL CORPORATION

AMERICAN IRON AND STEEL WORKS

JONES & LAUGHLIN BUILDING, PITTSBURGH, PENNSYLVANIA

Sales Offices: Atlanta Boston Buffalo Chicago Cincinnati Cleveland Dallas Detroit Denver Erie Los Angeles
 Memphis Milwaukee Minneapolis New York Philadelphia Pittsburgh St. Louis San Francisco Washington

Warehouses: Chicago Cincinnati Detroit *Memphis Pittsburgh

*Distributing Warehouse for Pipe, Wire Products, Sheets, Spikes and Bars for Concrete Reinforcement

Canadian Representatives: JONES & LAUGHLIN STEEL PRODUCTS COMPANY, Pittsburgh, Pa., U. S. A., and Toronto, Ont.

We hope you **USE SPRINGS**

... We have been making them for eighty-four years, at least, so we've been told.

... Even so, we don't know all about Springs but all we do know is about Springs. That knowledge is yours for the asking.

... The spring business is peculiarly like the old village blacksmith. He puts shoes on the horse that you bring to him.

... We don't stock up a lot of springs and then go around trying to sell them. We have to wait for you to tell us what you need. Each and every spring we make is especially made to fit your special needs.

... We make springs of round wire, square wire, oblong wire; we make them to

stretch, we make them to compress, and we make torsion springs.

... We take flat spring steel and stamp out every conceivable shape from dies that are made to suit your wants.

... We not only know how to do that but we can harden and temper them to suit your needs and can give you most any kind of a finish you want.

... We will try our best to make them at a price that will suit your pocketbook and in ample time to suit your needs.

... We will write you quotations or will call and discuss the matter with you. We will tackle your problems as though they were our own and we will be just as nice and dependable as we know how.

An Inquiry from you??
We'll do the rest

THE DUNBAR BROTHERS CO.
QUALITY SPRINGS SINCE 1845
BRISTOL, CONNECTICUT



Quality
Spring
since
1845





**BARNES
MADE**

**Screw Machine
PRODUCTS**

to special specifications
or exacting tolerances

Any material up to 1 1/4" diameter

May we Quote?



Barnes-made Springs

Small Stampings and Spring Washers

ANY KIND — FLAT — SPIRAL — TORSION
ANY QUANTITY — ONE TO A MILLION
ANY MATERIAL — DELIVERIES TO SUIT

Watch for our Green Insert

THE WALLACE BARNES CO., BRISTOL, CONN.

**BARNES
MADE**



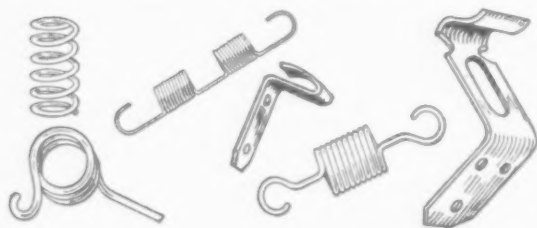
Cold Rolled Spring Steel

Annealed or tempered
Regular Carbons in stock or
Special Analyses to order

Great many sizes on hand
for immediate shipment

Ask for our quarterly "stock" list

IT takes Knowledge
to design a good spring



It doesn't show so much on the surface,
but a good spring has to be designed
for its particular work. Consult
our engineering department with your
spring problems. We will be glad to
help you solve them and with no
obligation on your part.

*Send us your inquiries for estimates
on coil springs, flat springs, special
wire forms, and small stampings.*

RAYMOND MFG. CO.
CORY, PENNSYLVANIA

WE DO GET 'EM OUT

GIBSON-SPRINGS

ANY DESCRIPTION
ANY MATERIAL

WM. D. GIBSON CO.

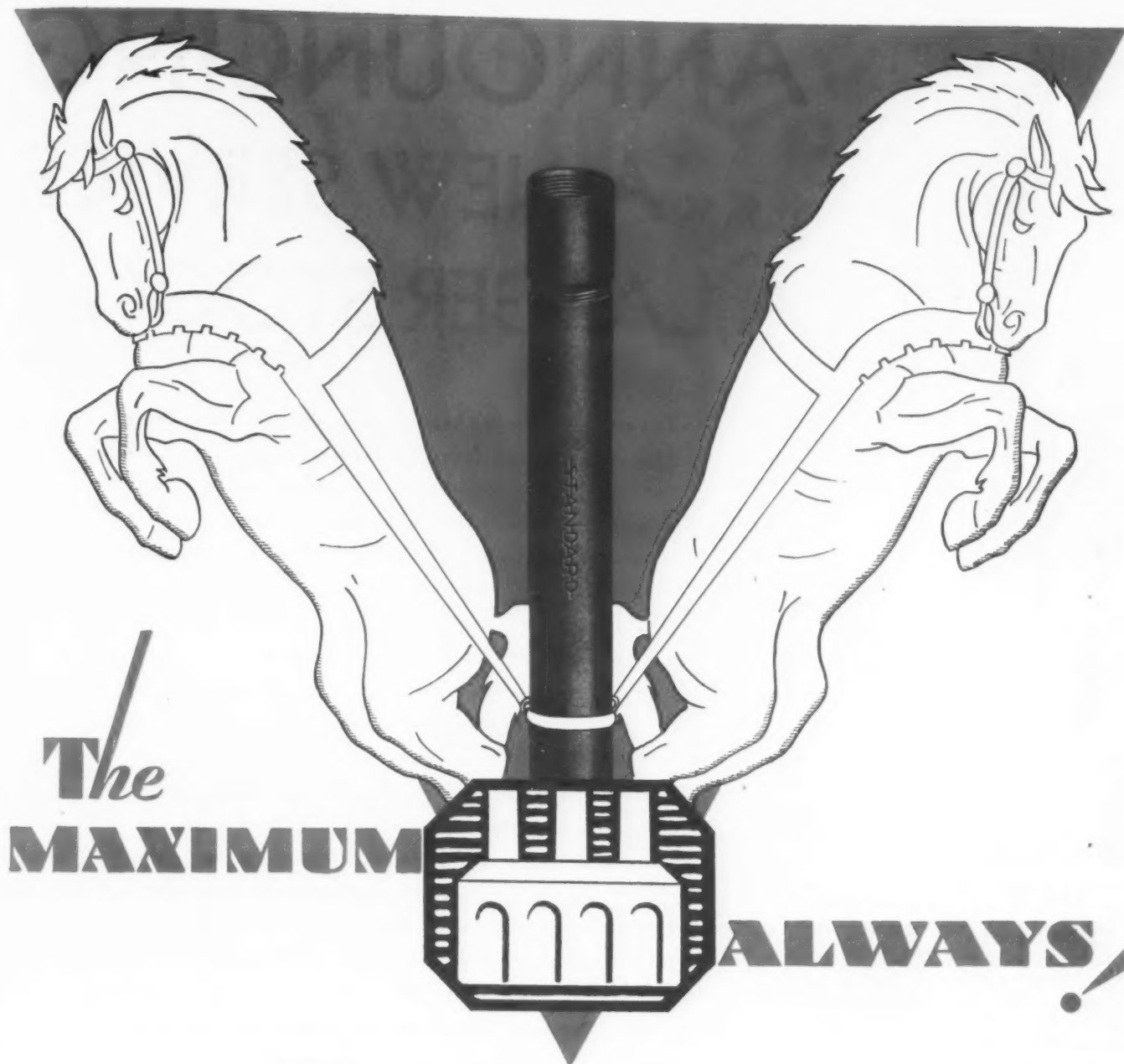
1800 CLYBOURN AVENUE
CHICAGO, ILL.

PLANTS FOR SPRING SERVICE

DETROIT DIVISION
6400 MILLER AVENUE, DETROIT

COOK SPRING CO. DIVISION
ANN ARBOR, MICHIGAN
OF

BARNES-GIBSON-RAYMOND
INCORPORATED



Behind the super-power of many modern power plants is the super-strength of "Standard" Seamless Power Piping—securely harnessing the powers of thousands of steam horses—safely guarding the pent up force of super-heated steam and sending it to the tasks of industry.

"Standard" Seamless is nationally distributed and readily available in any size, dimension or standard specification.

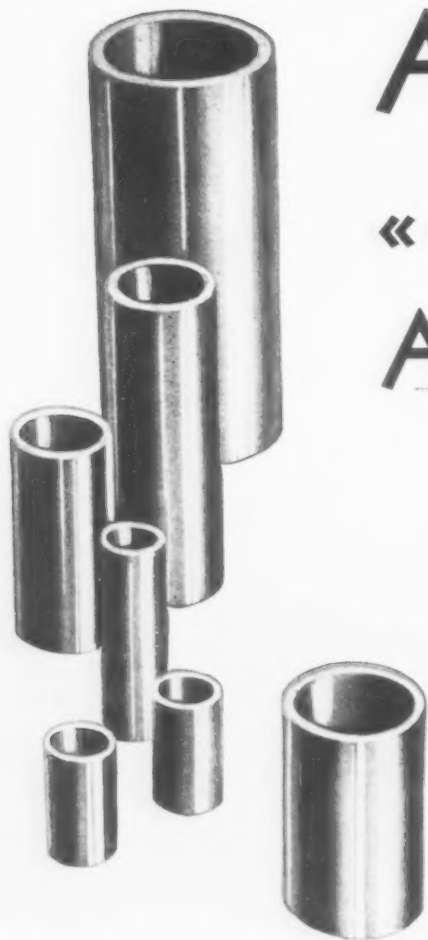
SPANG, CHALFANT & Co., Inc.

General Offices: CLARK BUILDING, PITTSBURGH, PA.

*Sales Offices: CHICAGO, ILL. NEW YORK, N. Y. ST. LOUIS, MO. PITTSBURGH, PA. TULSA, OKLA. LOS ANGELES, CAL.
Welded Mills: ETHA, PENNA. SHARPSBURG, PENNA. Seamless Mills: AMBRIDGE, PENNA.*

STANDARD

Seamless Steel POWER PIPING



Write For This NEW Stock List

Write for our new stock list card . . . showing dimensions of 500 Bunting "Ready Made" ready-for-assembly bronze bushing bearings, which you can procure as you need them and at sharply reduced prices. Any quantity is instantly available at any time. This card should be in every engineering department, drafting room and shop. Write for it.



ANNOUNCING

« « « A NEW SERVICE

A LARGER STOCK » » »

You can have a Bunting bearing engineer in your plant within 24 hours to counsel with you on the design, alloy and application of the bearings in your product. Such engineering counsel does not cost you anything nor obligate you in any way. It is a new service rendered by our staff of traveling engineers who will apply to your individual bearing problem the new and valuable knowledge gained in our research work in collaboration with the United States Bureau of Standards.

New and lower prices are now effective on all Bunting Quality Phosphor Bronze Bushing Bearings. Readjust your cost figures in conformity with this reduced price of bronze bearings.

We have added 50 sizes to our list of Bunting "Ready Made" completely machined and finished Bronze Bushing Bearings, always carried in stock for immediate delivery at the factory and all Bunting branches. These new added sizes greatly expand the application of "Ready Made" bearings to all mechanical industry. Write for this new and larger list showing the added sizes and lower prices.

Here are three big, distinct, valuable contributions to a better product and a lower cost in your own operation.

THE BUNTING BRASS & BRONZE COMPANY
TOLEDO, OHIO

Branches and Warehouses at New York, Chicago, Boston, Philadelphia, San Francisco
Export Office—Toledo, Ohio



BUNTING

QUALITY

PHOSPHOR BRONZE

BUSHING BEARINGS

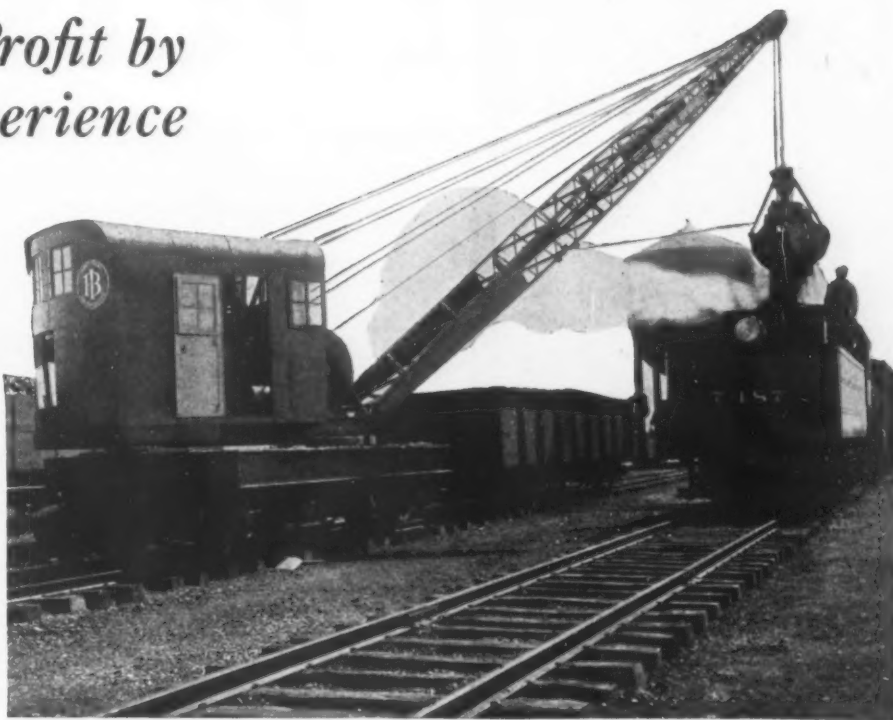
PATENTED

JUDGE CRANE VALUES THE WAY BIG USERS DO

*You Can Profit by
Their Experience*

Of all the locomotive cranes in service, those purchased by the railroads, iron and steel companies and the big utilities are the ones most often bought solely on performance records. Some of these companies use and keep costs on hundreds of cranes, their handling work is hard, and they employ large engineering staffs who know crane design and pass on every purchase. Consequently, their judgement is valuable to anyone interested in the economical handling of materials.

Go to any of these large plants throughout the country and ask their opinion about an Industrial Brownhoist. Let them tell you that no better cranes have ever been built, that they will handle materials at a lower cost per ton and that they will stand



Thirty-ton capacity Gasoline Powered Locomotive Crane coaling a locomotive. Because of their fast operating speeds and dependability, thousands of Industrial Brownhoists are used by the Nation's Railroads for all kinds of handling work.

up better and last longer. Consider, too, that this is not just idle talk because these same industries have bought far more Industrial Brownhoists than any other make of locomotive crane.

Industrial Brownhoists are sold by our own factory-trained men. Discuss your material handling methods with them and you will find that their experience makes possible many helpful suggestions. There is no obligation, of course.

Industrial Brownhoist Corporation, General Offices, Cleveland, Ohio

District Offices: New York, Philadelphia, Pittsburgh, Detroit, Chicago, New Orleans, San Francisco, Cleveland.

Plants: Brownhoist Division, Cleveland; Industrial Division, Bay City, Michigan; Elyria Foundry Division, Elyria, Ohio.

INDUSTRIAL BROWNHOIST



Baker

IN THIS YEAR of smaller profit margins, the concern with the lowest production costs will win. We are prepared to prove that Baker Trucks can reduce handling costs in production by as much as 75%. And that, too, without adding to capital charges because Baker Trucks actually pay back their entire purchase price—in payroll saved—in from 3 to 12 months.

Baker Industrial Truck Division of
THE BAKER-RAULANG COMPANY
2180 West 25th St. .. Cleveland, Ohio

M A Y A R I N I C K E L - C H R O M I U M S T E E L S

Made by the pioneer makers of Nickel- Chromium Steels



When alloy steels were first resorted to, in the search for materials having higher physical properties than the steels then available, it was found that nickel-chromium steels made with the natural nickel-chromium alloy, Mayari Pig Iron, as a base, possessed an extremely desirable combination of the properties that make for long life in service.

The organization which first made these Mayari Nickel-Chromium Steels later became a part of Bethlehem Steel Company. Consequently Mayari Nickel-Chromium Steels, in addition to the inherent excellence and high shock-resistance due to their composition, have a remarkable, though intangible, superiority arising from manufacture by the pioneer makers of alloy steels of this analysis. Long contact with users of alloy steels enables Bethlehem to

focus on each consumer's problem the resources of knowledge and skill that have been accumulated through many years of experience.

If you have a condition that places unusual demands on alloy steel try Mayari Nickel-Chromium Steels. They have built up an enviable reputation for dependability.

BETHLEHEM STEEL COMPANY

General Office: Bethlehem, Pa.

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Buffalo, Pittsburgh, Cleveland, Cincinnati, Detroit, Chicago, St. Louis

Pacific Coast Distributor: PACIFIC COAST STEEL CORPORATION,
San Francisco, Los Angeles, Seattle, Portland, Honolulu

Export Distributor: Bethlehem Steel Export Corporation,
25 Broadway, New York City

BETHLEHEM



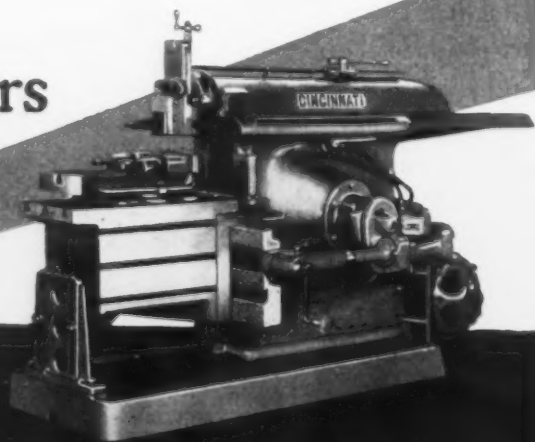
Every flat bearing surface on Cincinnati Rapid Traverse Shapers has a gib. They are full length tapered gibs with a single screw adjustment.

The Cincinnati sliding block is gibbed—an important and necessary feature. The ram bearing has a full length tapered gib which forces the ram bearing to wear straight—an equally important feature.

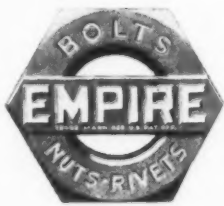
If you appreciate the value of single screw adjusting full length tapered gibs; if you appreciate the value of a uniform adjustment from a single point; and if you demand a take-up on every flat bearing surface—your next shaper purchases will be limited to Cincinnati Rapid Traverse Shapers.

The Cincinnati Shaper Co., Cincinnati, Ohio

Cincinnati Shapers
Rapid Traverse



The Buyer Cracks the Whip!



WHEN you get an order today, the buyer specifies the delivery—how different from those golden days of '29!

And you're probably not carrying the stock of bolts you used to—inventories being what they are these days.

So when that order has to be out in no time at all . . . and you're stuck for bolts . . . call any Russell, Burdsall & Ward office. Three great plants to draw from . . . practically over-night service.

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

PORT CHESTER, N. Y.

ROCK FALLS, ILL.

CORAOPOLIS, PA.

Philadelphia • Chicago • Detroit
San Francisco • Los Angeles
Seattle • Portland



TUB

Members of 195 Reade Street
Manufacturers of

American Hardware.

25. Coe's & Taft's Pattern Wrenches.
Augers and Auger Bits.
Gimlets and Gimlet Bits.
Whittuck's Family and Counter Scales.
Yaw's Cow Bells.
Axe, Pick, Sledge and Hammer Handles.
Wire Nelves.
House Traps.

Curry Mills,
Boring Machines,
Portable Forges.

ALSO,
COOLEY'S PATENT WHIP RACK.

GEORGE WHEELER,

115 CHAMBERS ST. NEW YORK AGENT.

HOO.

HAMILTON
WIB

WIRE

Nos. 1716,

AS

Office on

IRON AND

JOHN A.
TI

INCLINED PLATE
STANDING
SUSPENSE
BT

A large stock
Orders filled
For
which will be

JASPER

MANUFACTURED

WIRE

Sieves, Riddles,

No. 50 CHIT ST.

Hartford

Wire Goods

Sale.

Wire

WIRE, FENCES

CO.,
NEW YORK.

CO.,
NEW YORK.

Sheet Iron,

R. WIRE,

r. Solder, &c.

19 Beekman Sts.

SKIN

AND,

and Cobalt.

McCOY,
New York.

COY,
NEW YORK.

SPELTER,
NEW YORK.

Fuller, Dana & Fitz,

IMPORTERS AND COMMISSION MERCHANTS,
BOSTON, 110 North Street.

Tin Plates, Sheet Iron, Metals, Iron, Steel, Etc.

Exclusive Boston Agents for the sale of Morris, Taylor & Co's Lap Welded Boiler Tubes, Patent Wrought Iron Beams, Columns, etc. Patent "Borden Best" Iron.

MORTON, REED & CO.,

No. 65 South Gay Street, BALTIMORE

METAL BROKERS.

MANUFACTURERS' AGENTS FOR

Baltimore Machinists' Society

NEW YORK

WHAT!

Pay for white space?

The skill of the advertising "experts" of 60 years ago was, seemingly, measured by the amount of material they could crowd in a given space. Each advertisement contained its full quota—sometimes cuts, but always plenty of type in a wide assortment of styles and sizes. No space was "wasted." We can almost hear them say, "What! pay for white space?"

Yet it is not so long ago when the cry was for white space and more white space. It was the new idea in the best advertising circles.

New? How about this advertisement which was published in *The Iron Age* in 1873! Here is white space, and how it did make the advertisement stand out. Yet radical as this advertisement was, it is doubtful if the idea was entirely new even then. This type of layout had undoubtedly been used by others years before.

And what of future advertising? What will it look like? Will new

methods of presentation and new selling slants be evolved. Probably, but no one knows what the trend will be. Just now it is *all* white space.

So with our industrial future—it is still white space to be filled with the record of tomorrow's accomplishments.

It is with these that the 75th Anniversary Number of *The Iron Age* to be published November 20, 1930, will be concerned. It will be its function to discover what marks we may now place on the white pages of the future. It is going to look back in order to see ahead. It will penetrate the shadows cast before important events in the past so that we may recognize the shape of the present shadows that are significant of future events.

It will give you a splendid opportunity to present the picture of the part which your products have played in industry in the past and will play in the future.

22 Pieces per Hour —200 per Sharpening

A cast iron vise slide—eight surfaces milled fast and accurately by a gang of Brown & Sharpe Cutters.

Two Half Side Milling Cutters, two Milling Cutters and two Inserted Tooth Side Milling Cutters remove ten cubic inches of material per minute at a spindle speed of 49 R.P.M. and a table feed of seven inches per minute.

The production schedule shows an average of twenty-two pieces per hour—a high production which is ably maintained since the gang mills two hundred pieces between sharpenings.

On every job, Brown & Sharpe Cutters afford opportunity of lowering cutter costs. Ask for your copy of Small Tool Catalog No. 31 listing a complete line of cutters. Brown & Sharpe Mfg. Co., Providence, R. I., U.S.A.

The cost of
Time Lost Removing Cutters
Plus Time Lost Replacing
Cutters
Plus Lost Production
Plus Sharpening Cutters
Plus Original Purchase
Equals
REAL Cost of Cutters
—
What is the Real
Cost of Your Cutters?



Eight Surfaces — milled rapidly and accurately. The Brown & Sharpe Cutters, at a minimum number of interruptions for sharpening, maintain satisfactorily the fixed distances and relationship between the surfaces.



Brown & Sharpe Cutters

Lower Production Costs

INDUSTRIAL STEEL CASTINGS



The above illustration made from unretouched photographs



The small castings bay of the Industrial plant is specially organized, equipped and manned for efficient production of castings of the type shown in the above illustration. Users tell us that Industrial castings are exceptionally uniform, clean and sharp, even when the pattern is intricate and involved. Such castings are ideal for machining and actually reduce machining costs . . . The best way to test the suitability of Industrial Steel Castings to your needs is to send a small trial order. Or blue-prints may be mailed for quotation.

THE INDUSTRIAL STEEL CASTING COMPANY - TOLEDO, OHIO

HAVE YOU CHECKED ✓ ✓ ✓ ✓ BLAST PRESSURE LOSSES BETWEEN STOVES and FURNACE ?

A 5-lb. difference in blast pressure between blowing engine and furnace tuyeres was found at a blast furnace plant. Investigation disclosed the major portion of the loss to be through the angle type of hot blast valve and its connections. Substitution of the Mathesius Hot Blast with its straight-way connections reduces this loss to a few inches of water.

This pressure drop is a direct operating loss in unnecessary steam or power consumption. In many cases, this limitation on the maximum blast pressure delivered at the furnace represents a limitation of pig iron output.

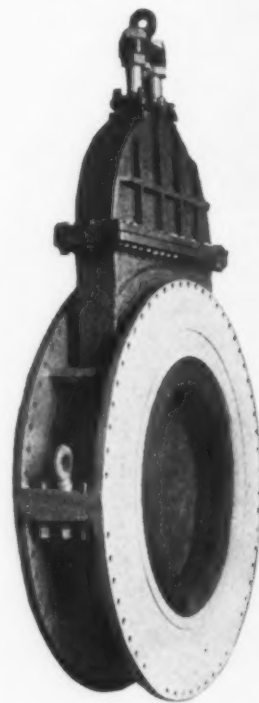
In designing new or remodeling old hot blast stoves or air mains, careful consideration should be given to the type of hot blast valve. This is particularly important where additional blast volumes are required in rebuilt blast furnaces.

MATHESIUS

Hot Blast Valve



This valve consists of a correctly tapered gate swinging and moving freely between two parallel bronze seats. Both gate and seats are water cooled. The advantages of this valve lie in the very low pressure loss thru it, in the absolute prevention of leakage and in the straight-way connection between the stove and hot blast main, which eliminates the right angle bends and difficult brickwork in the mushroom type of valve. There are over 175 installations.



FREYN-DESIGN

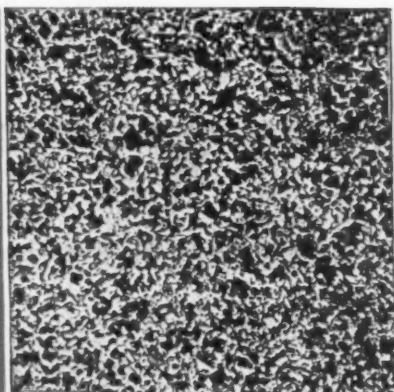
Let us tell you more about the Mathesius Hot Blast Valve. A descriptive bulletin will be sent at your request.

Freyn Engineering Company

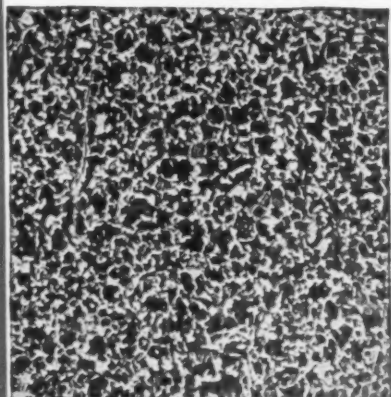
CONSTRUCTORS - ENGINEERS - SPECIALTIES

310 South Michigan Avenue

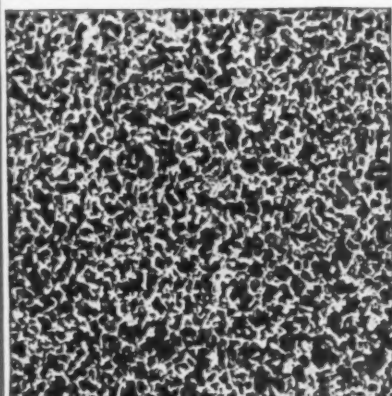
CHICAGO, ILLINOIS



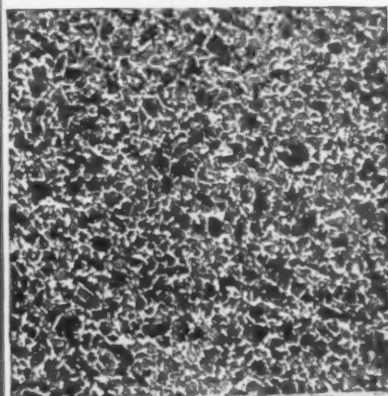
• 39 Carbon 100X
Normalized



• 40 Carbon 100X
Normalized



• 43 Carbon 100X
Normalized



• 48 Carbon 100X
Normalized

UNIFORMITY With Densite

● One of the outstanding features of Densite Refined Steel is its uniform grain structure. Microphotographs shown at the left were made from 1" rounds and range from .39 carbon to .48 carbon, 100 ton heats—basic open hearth.

● UNIFORMITY OF PRODUCT is another of the many virtues Densite brings to steel. Of thousands of tons of Densite Refined Steel shipped to many different customers, none have been rejected—in fact not one has required the services of a "trouble shooter" to keep it sold. Densite steels don't come back; they stay sold because of their superior quality. Steels treated with Densite, whether plain carbon or alloy, are cleaner, more uniform and tougher.

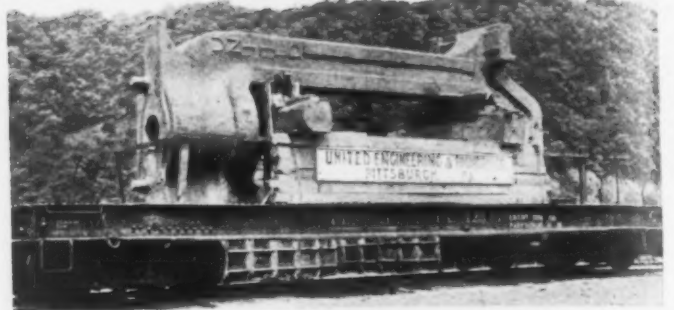
● Steel makers and users alike can profit by using Densite. If you make steel, write for further information. If you are a user of steel, specify "Densite Refined" when ordering your next requirement from your REGULAR source of supply, or write us for further information.



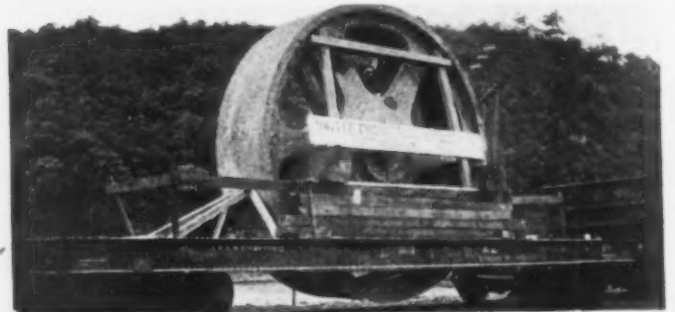
DENSITE CORPORATION OF AMERICA

CLARK BUILDING :: PITTSBURGH, PA.

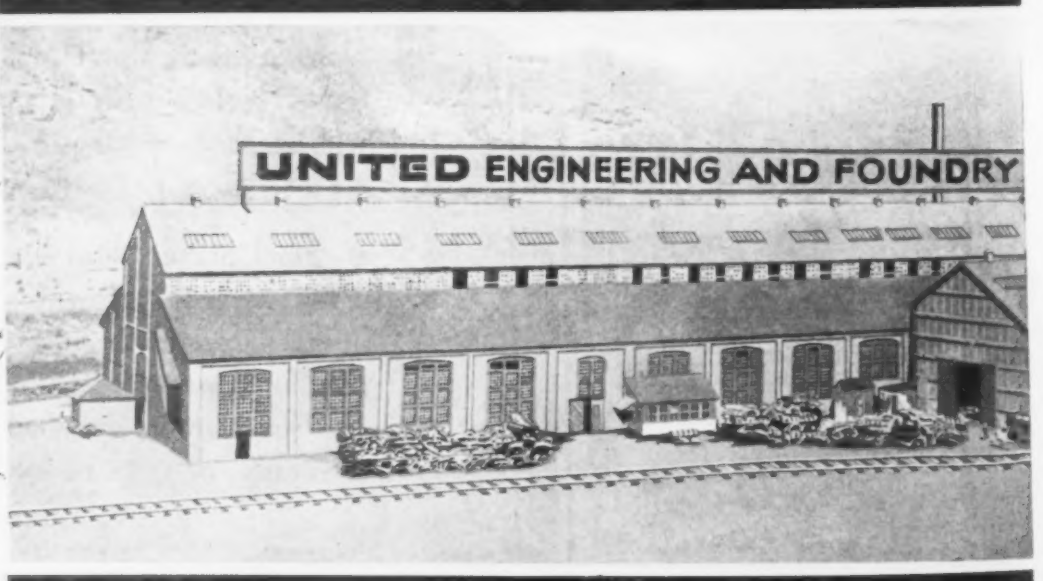
MASSIVE



Mill Housing. Size 13' 2" x 24' x 5' 2". Weight 165,800 pounds



Drive Gear. Size 15' 8" P. D. x 52" F. Weight 85,280 pounds.



STEEL FOUNDRY, VANDERGRIFT, PA.

Modern in design and equipment, coupled with the application of scientific metallurgical practices, the plant embodies such potent factors in the production of steel castings as to place it foremost among steel foundries in capacity and excellence of product.

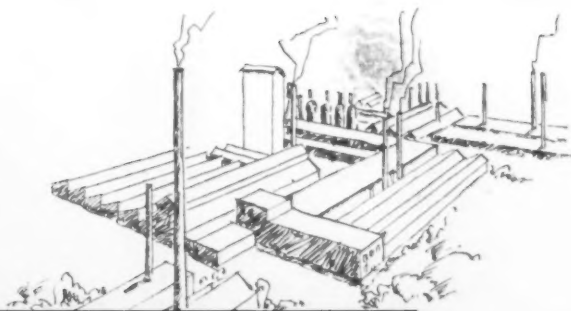
Located away from any large city, we have the undivided service of good railroad connections, insuring promptness in the delivery of our material and the shipping of our finished product.



Mill Pinion. 22' $\frac{3}{4}$ " long. Weight 121,220 pounds

STEEL

CASTINGS



A shipment from the United Steel Foundry of just a few of the massive steel castings required for the World's

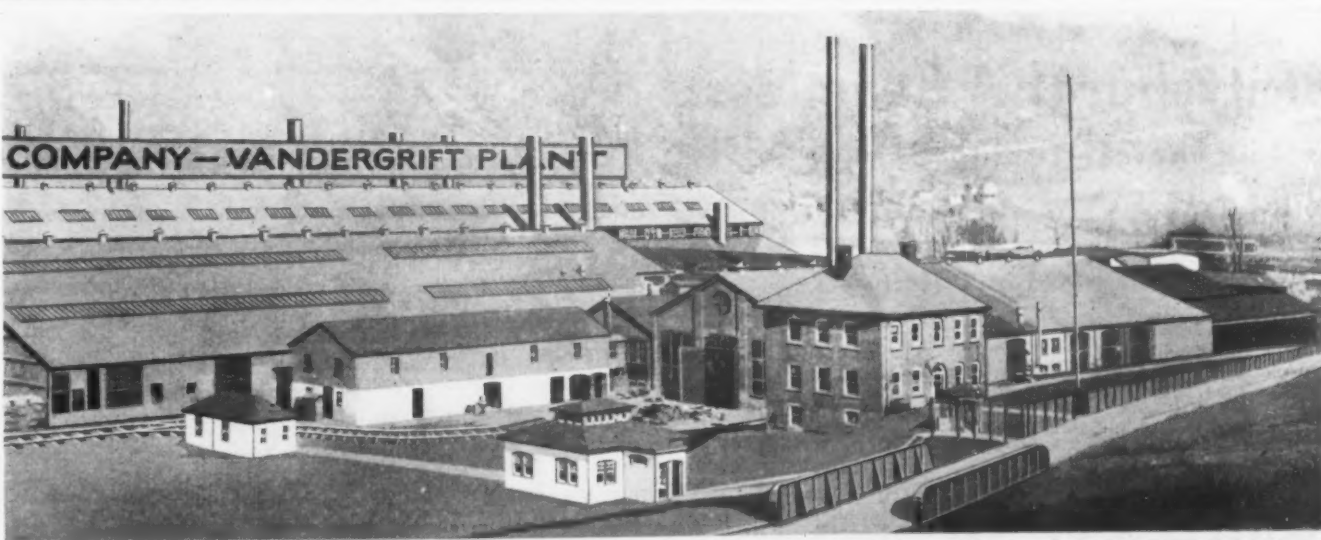
Largest Continuous Plate Mill, which is now being erected in United machine shops.



Hub for 21' 4" P. D. x 6' 3" F. Gear. Weight 82,100 pounds

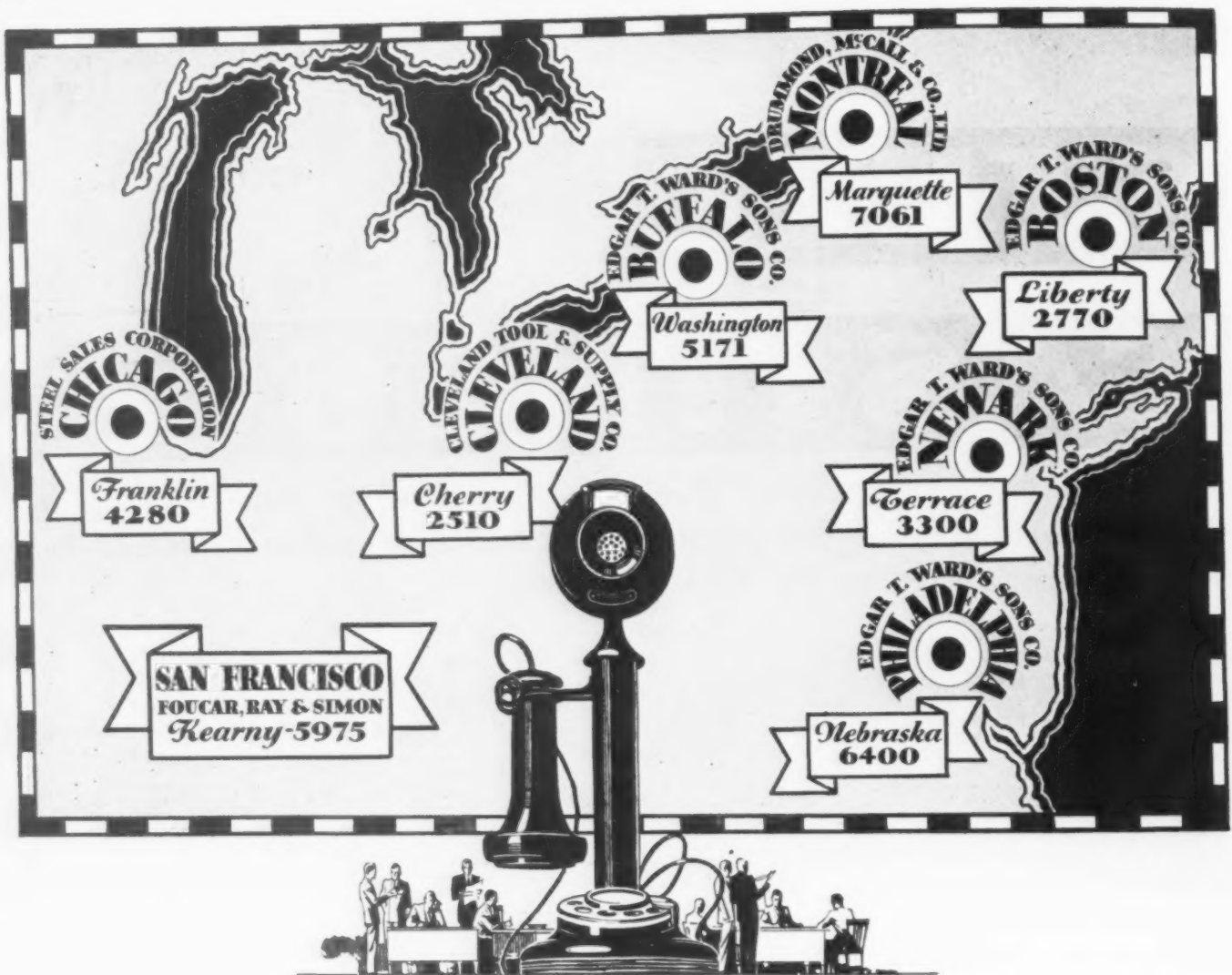


Shear Housing. 15' 10 1/2" x 22' 2". Weight 151,100 pounds



UNITED

ENGINEERING & FOUNDRY COMPANY
PITTSBURGH, PENNSYLVANIA



"Pittsburgh" Seamless

Mechanical Tubing Service is
as Close as Your Phone . . .

Whether You Need a Pound
or a Carload in a Hurry—
Call Your Nearest Dealer.

Quick deliveries are assured by large stocks maintained by jobbers in the cities shown on the map above. Get acquainted with your local dealer for prompt service.

Pittsburgh Steel Products Co.

Pittsburgh
New York
St. Louis

Division of
Pittsburgh Steel Co.
Tulsa

Detroit
Chicago
Houston

BOSTON—Edgar T. Ward's Sons Company—50 Farnsworth Street, Telephone LIBERTY 2770.

BUFFALO—Edgar T. Ward's Sons Company—39 River Street, Telephone WASHINGTON 5171.

CHICAGO—Steel Sales Corporation—129 South Jefferson Street, Telephone FRANKLIN 4280.

CLEVELAND—Cleveland Tool and Supply Company—1473 West Sixth Street, Telephone CHERRY 2510.

MONTREAL—Drummond, McCall & Company, Ltd.—930 Wellington Street, Telephone MARQUETTE 7061.

NEWARK—Edgar T. Ward's Sons Company—400 Frelinghuysen Avenue, Telephone TERRACE 3300.

PHILADELPHIA—Edgar T. Ward's Sons Company—Cedar and Westmoreland Streets, Telephone NEBRASKA 6400.

PITTSBURGH—Pittsburgh Steel Products Company—Union Trust Building, Telephone ATLANTIC 4760.

SAN FRANCISCO—Foucar, Ray & Simon—512 Folsom Street, Telephone KEARNY 5975.

Pittsburgh Seamless

MECHANICAL TUBING

"Save with Steel"

INLAND

Increases Savings from Steel

INLAND OPEN HEARTH STEEL

INLAND Copper-Alloy STEEL

"Steel Insures Strength and Security"

"Reinforced Concrete Economical--Enduring"

"Galvanized Sheets Protect"

Steel is a superior material for thousands of purposes. Inland strives to help steel users and Industry generally by supporting all constructive efforts to educate the public to the advantages and correct uses of steel in its many different forms. But Inland goes further. By research work, by service—Inland *increases* savings from steel. Our vast resources are applied without stint to the problems of improving steel as a material for Industry's use . . . of producing a better steel for each application . . . of helping Inland users save more for themselves and for their customers by building up an adequate and reliable source of supply for the Central West.

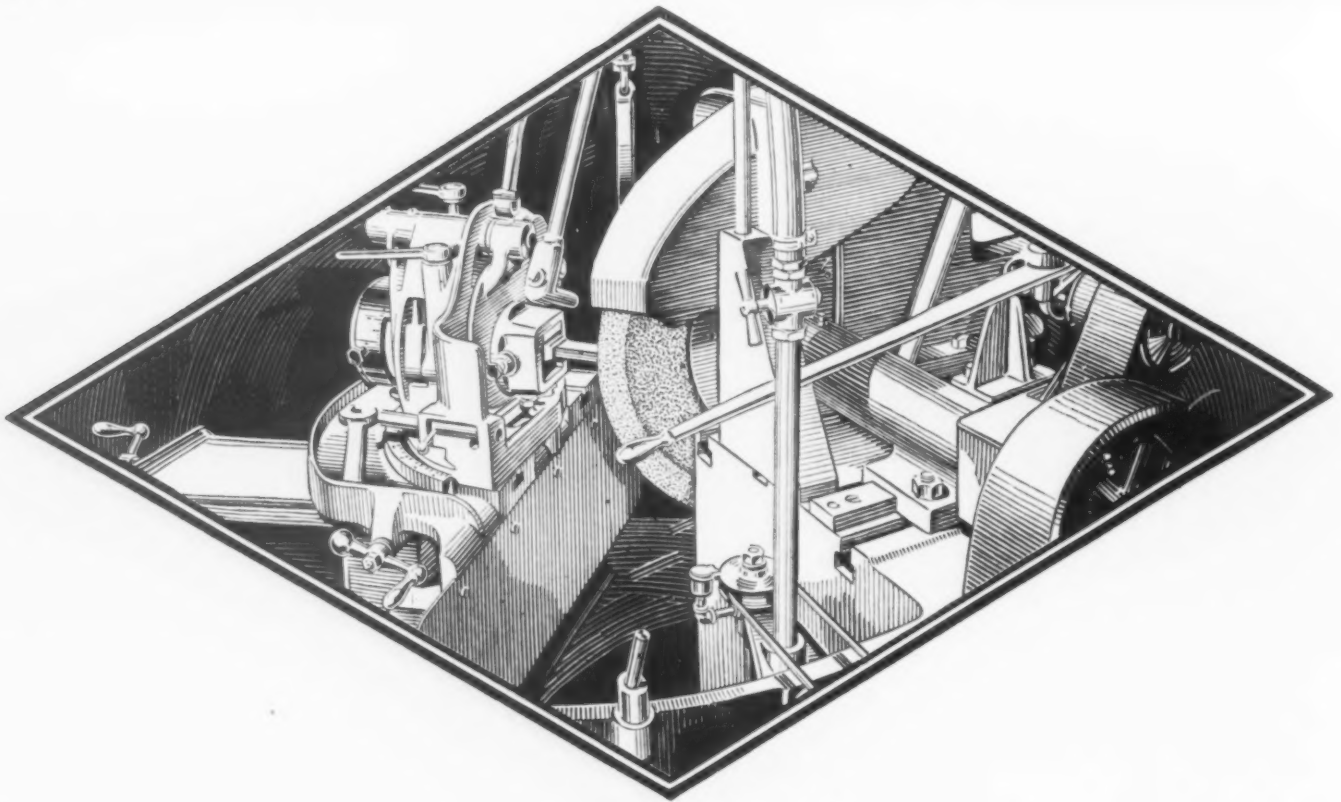
Standardize on Inland . . . increase, protect your savings from steel.

INLAND STEEL COMPANY

ABLE SERVANT OF  THE CENTRAL WEST

38 SOUTH DEARBORN STREET, CHICAGO

SHEETS, BANDS, BARS, STRUCTURALS, PLATES, RIVETS, RAILS, TRACK ACCESSORIES, BILLETS



TOOL STEEL GOES FARTHER *a Sellers + Quality*

Tool steel is expensive—don't waste it. The Sellers Tool Grinder automatically duplicates the exact required angles and shapes of cutting tools,

grinding away only the minimum amount of metal necessary to produce or restore the correct shapes. With the Sellers Tool Grinder, one operator grinds all tools in a centralized tool-room. Every grinding produces the maximum quality and quantity of work because the tool is right by formulae—not approximately so, according to each workman's individual opinion or skill. Standards are established and maintained. Production is speeded up because workmen remain at their machines. Rejections due to poorly ground tools are eliminated. Labor costs for grinding are minimized.

WILLIAM SELLERS & COMPANY

ESTABLISHED 1845

INCORPORATED

PHILADELPHIA, U.S.A.

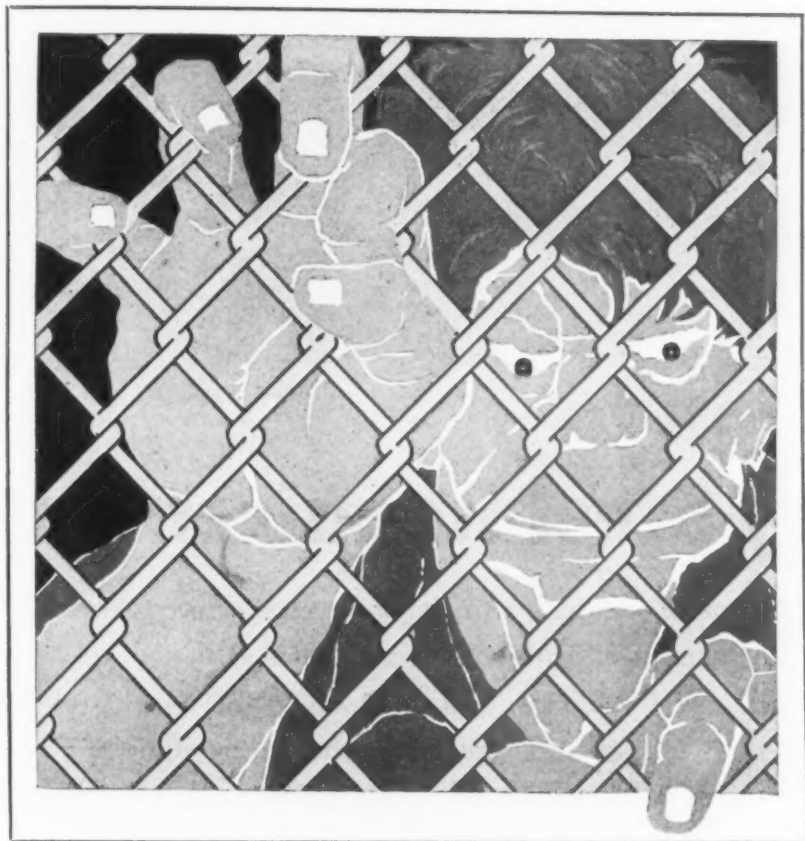
Sellers Industrial Tools comprise Drill Grinders, Tool Grinders, Spiral Gear Drive Planers, Boring and Turning Mills, Floor Boring Machines, Planer Type Milling Machines, etc.



Sellers Railroad Tools comprise Car Wheel Lathes, Driving Wheel Lathes, Car Wheel Boreers, Driving Box Boreers. Also manufacturers of Sellers Locomotive Injectors.

UNIFORM WIRE *puts* FENCE

within the reach of ~



Theft, vandalism, and arson are banished . . . a new respect for property rights comes into being . . . the entrance to and the exit from private properties are controlled . . . when protected by Wickwire Spencer Fence.

ALL INDUSTRY



A NEW respect for property rights has come into being . . . ravages from arson, vandalism and destructive forces from without are thwarted and protected boundaries are the order of the day . . . Wickwire Spencer Chain Link Fence is within the financial reach of every industry.

WICKWIRE SPENCER MAKES UNIFORM

Wire of all kinds
Wire Rope
Wire Reinforcing Fabric
Clinton Wire Lath
Wire Screen Cloth
Wire Poultry Netting
Chain Link Wire Fence
Wire Springs & Spirals
Wire Grilles & Cages
Wire Diamond Mesh
Perforated Metal Grilles
Perforated Metal Screens
Perforated Centrifugal
Linings
Wissco Card Clothing
Wissco All Steel
Radiator Furniture

The manufacture of Copper-Bearing Steel wire, so uniform as to permit its being woven on high speed looms, has brought this about. Galvanizing after weaving has made this fence rust proof and permanent.

The lifelong endeavor of this Company has been to produce the most uniform wire possible and the finest wire products. Years of costly research, strict adherence to scientific methods and the most modern type of plant and equipment have made this ambition a reality.

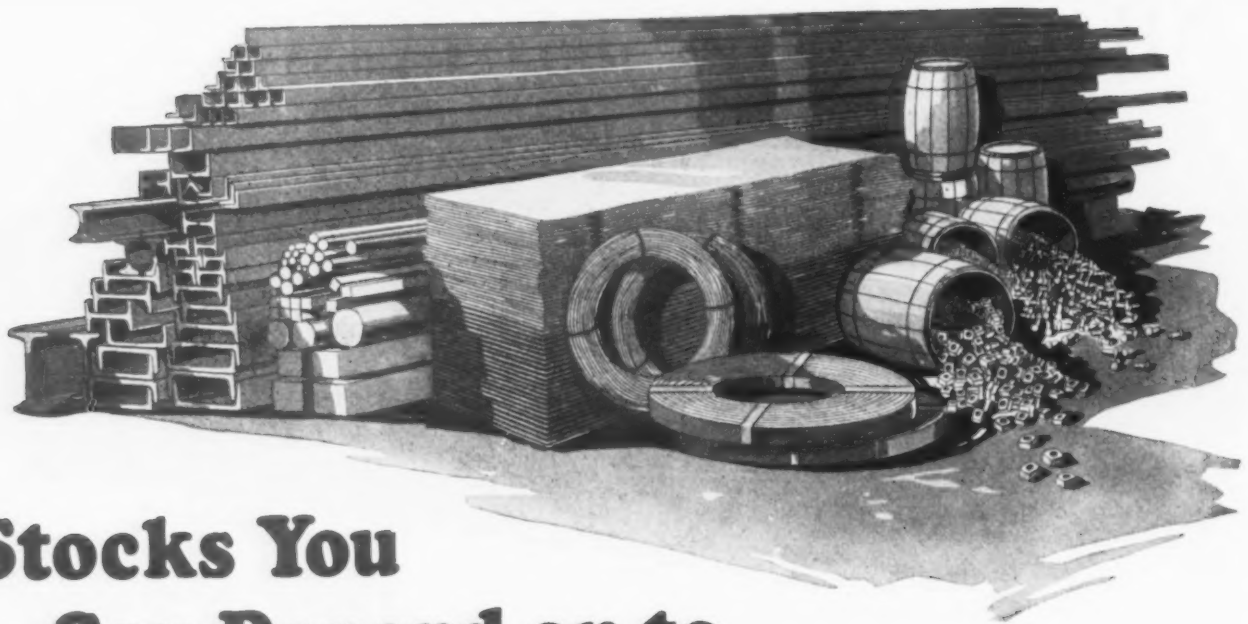
WICKWIRE SPENCER STEEL CO.
41 East 42nd Street New York City

Worcester
Buffalo
Cleveland

Chicago
Tulsa
San Francisco

Los Angeles
Seattle
Portland

WICKWIRE SPENCER
WIRE PRODUCTS



Stocks You Can Depend on to Meet Every Steel Requirement

Steel in every shape and size—standard and special grades—more than 175,000 tons always in stock for immediate shipment.

No matter what your requirement — as to special product or emergency delivery—you can call on Ryerson with reasonable assurance that everything possible will

be done to meet your requirements well within the time specified.

There is a Ryerson plant near you. There is another near your branch or job. This permits distant as well as local buying to the best advantage. Order from the plant nearest you. Immediate shipment is assured.

A few of the 1001 items in stock for immediate shipment

Bars	Refined Iron	Boiler Tubes	Alloy Steel
Structurals	Turned Ground and	and Fittings	Tool Steel
Rails	Polishing Shafting	Welding Rod	Concrete Reinforcing
Plates	Screw Stock	Forging Bar	Firmtread Plates
Sheets, Blk. & Galv.	Strip Steel	Babbitt Metal	Small Tools
Sheets, Full Finished	Rivets and Bolts	Allegheny Metal	Machinery, etc.

Write for the Ryerson Journal and Stock List—the "Key" to Immediate Steel

JOSEPH T. RYERSON & SON INC.

*Plants: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City
Representation in: Minneapolis, Rockford, Kansas City, Tulsa, Houston, Dallas, Newark,
New York, Denver, Los Angeles, San Francisco*

RYERSON

STEEL - SERVICE

THE IRON AGE

Contents for October 2, 1930

Metal Etching a Growing Art	905
Future of the Small Manufacturer	908
Management of a Small Plant	909
Quenching and Tempering Steel Castings	914
Annealing and Galvanizing Strip	918
Stools for Ingot Molds	920
Reclaiming Oil from Turnings	922
Machine Shop Accounting	925
Cold Rolling Machine Parts	928
Hardness Tables	932
Dr. Haney's Page	937



W. W. MACON, Editor
A. I. FINDLEY, Editor Emeritus
G. L. LACHER, Managing Editor
C. E. WRIGHT, News Editor

E. F. CONE
S. G. KOON
R. E. MILLER
G. S. HERRICK
F. L. PRENTISS
Cleveland
R. A. FISKE
Chicago
T. H. GERKEN
Pittsburgh
BURNHAM FINNEY
Detroit
L. W. MOFFETT
Washington
GERARD FRAZAR
Boston
R. G. MCINTOSH
Cincinnati

IRON AGE PUBLISHING CO.
230 West 39th Street,
New York, N. Y.

Cable Address: "Ironage, N. Y."

F. J. FRANK, President
G. H. GRIFFITHS, Secretary
C. S. BAUR, General Advertising
Manager

Division of
UNITED BUSINESS PUBLISHERS, INC.
New York, N. Y.

District Offices:
CHICAGO, Otis Building
PITTSBURGH, 1319 Park Building
CLEVELAND, 1362 Hanna Building
PHILADELPHIA, 1402 Widener Bldg.
DETROIT, 7338 Woodward Avenue
WASHINGTON, 536 Investment Bldg.
CINCINNATI, 409 Traction Building
BUFFALO, 616 Ellicott Square
BOSTON, Room 230, 80 Federal St.
SAN FRANCISCO, 381 Bush Street

Copyright, 1930, by
IRON AGE PUBLISHING CO.
Member, Audit Bureau of Circulations
Member, Associated Business Papers
Published every Thursday. Sub-
scription Price: United States and
Possessions, Mexico, Cuba, \$6.00;
Canada, \$8.50; foreign, \$12.00 a
year. Single Copy 25 cents.

New Equipment	933
Editorials	938
Markets and News	941
Personals and Obituaries	962
Business as Others See It	976

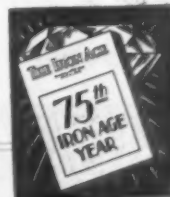
The Spotlight Is on These Two

BY men and by mail we call every week on thousands of manufacturers of metal products. We find that right now the two burning questions in the industry are:

1. When will business get better?
2. How can we cut our operating costs?

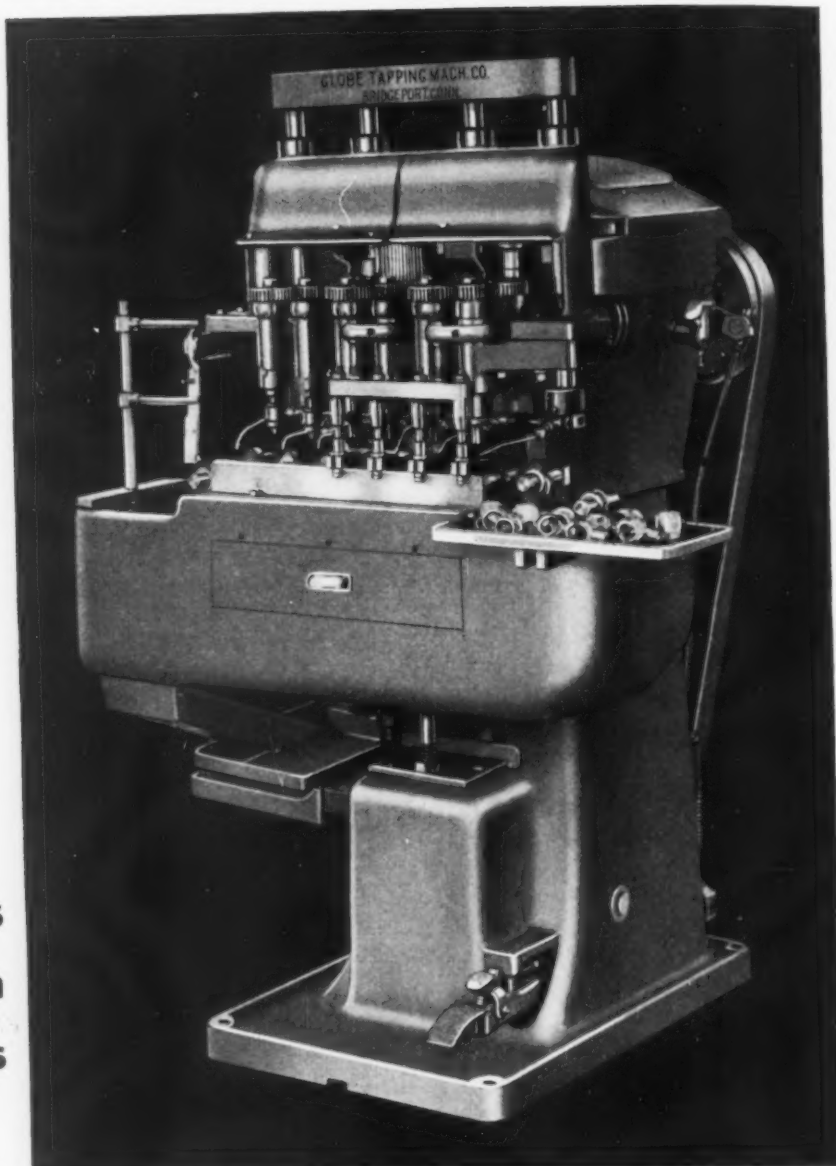
Mark how well THE IRON AGE answers them. The market reports tell who is buying, and how much. Dr. Haney studies statistics and tells us what they show for the future. THE IRON AGE gives you all the worth while trade statistics, so that you can do your own prognosticating if you care to. Our editorials discuss trade tendencies and interpret their significance.

The entire IRON AGE is an answer to the questions. The description of newly developed material or equipment (in the advertising or editorial pages) reports on production methods, a waste of elimination campaign, or a wage incentive system, or a production control plan—any one may mean a saving to you of hundreds of dollars, even more.—A. H. D., Reader Service Department.

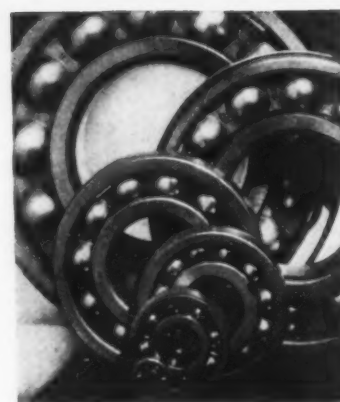


NOTHING ROLLS LIKE A BALL

**More records
broken with
New Departures**



The Globe Tapping Machine Company has just completed this special machine, of its own design, which drills 4 holes and taps 3 in an automobile part, at the rate of 25 pieces per minute. Spindles are rigid, sensitive, permanently accurate—free rolling on New Departure Ball Bearings. But all the attention was not lavished entirely on the more important parts, for New Departures are used all through the mechanism. It is a care-free machine . . . one capable of many years' performance with the least possible amount of trouble and upkeep expense. That is an outstanding characteristic of New Departure-equipped machinery. The New Departure Mfg. Co., Bristol, Conn.



NEW DEPARTURE BALL BEARINGS

This Issue in Brief

Etching of steel and non-ferrous metals has developed into highly specialized industry which produces artistic results by a process resembling the engraver's art. Bronze bulletin boards, elevator door panels and other decorative architectural effects achieved in larger areas than have hitherto been called for.—Page 905.

* * *

The small plant is not out of the running, says the president of the Sun Tube Corporation, Hillside, N. J., which produces an annual volume worth \$750,000 from a floor space of 7500 sq. ft. President Lynch declares that a small plant scientifically organized has the necessary essentials for competition with units of any size.—Page 908.

* * *

By quenching and tempering, the best properties of either plain carbon or alloy steel castings can best be brought out. Author makes plea for such treatment, basing his argument on a series of tests, showing properties as cast, after annealing and after quenching and tempering.—Page 914.

* * *

Chicago strip steel plant contains interesting installation, which anneals, cools, pickles, washes and galvanizes the strip continuously, automatically and at a high rate of speed.—Page 918.

* * *

Remarkable savings are reported to have been made from the practice of making stools for ingot molds, used in pouring of large ingots, of alloy gray iron or alloy cast steel, proving that ingot mold stools are of nearly the same importance as regards economy and production as the mold itself.—Page 920.

In a new patented process put into operation at the Gambrinus plant of the Timken Roller Bearing Co. at Canton, Ohio, 6000 gal. of cutting oil is recovered daily from 120 tons of steel turnings.—Page 922.

* * *

By means of mechanical tabulation many of the original shop records, such as time cards, clock-in-an-out cards, requisitions, etc., may be made to do double and triple duty in the machine shop. Many copying operations also may be eliminated, and the old payroll book may be discontinued.—Page 925.

* * *

Despite the business depression, a maker of collapsible tubes has been running its plant 60 per cent ahead of last year. How does it do this? By a somewhat unusual sales policy, by development of competition between apparatus units, by incentives to indirect labor and other factors. It has only 10 customers and a "waiting list." Read "Squeezing Gold Out of Tin."—Page 909.

* * *

That cold rolling the surface of machine parts raises the fatigue or endurance limit about 15 per cent is the conclusion from the results of torsion and bending fatigue tests on alloy steel at the Woehler Institute, Brunswick, Germany. Other tests have shown similar results with respect to copper, bronze and the light metal, Lualaba.—Page 928.

* * *

Danger of quench cracks in heat treatment of steel castings is eliminated by thorough refinement of metal before casting, by obtaining uniform temperature in piece to be treated, and attaining proper temperature for quenching operation.—Page 916.

No incentives paid to direct labor in New Jersey plant whose processes are largely automatic. All incentives are applied to indirect labor, which provides the brains and ability and shoulders the responsibility for output and quality. Development toward automatization tends to reduce proportion of direct labor.—Page 911.

* * *

Conveying system used in Timken plant in reclaiming cutting oil from turnings. Turnings are sprayed with hot water, which is pumped to the washer under 85 lb. pressure at rate of 1000 gal. per min. Oil, water and fine turnings flow into a sump, where turnings sink to bottom and are later taken out with a magnet. Oil and water flow into settling tank, where oil rises to top and is skimmed off, then passed to a centrifugal cleaner.—Page 923.

* * *

Turnings, amounting to 120 tons a day, produced in the plant of Timken Roller Bearing Co., are briquetted in 300-ton machines, after removal of cutting oil, and are charged in 25 lb. briquettes into open-hearth and electric furnaces.—Page 922.

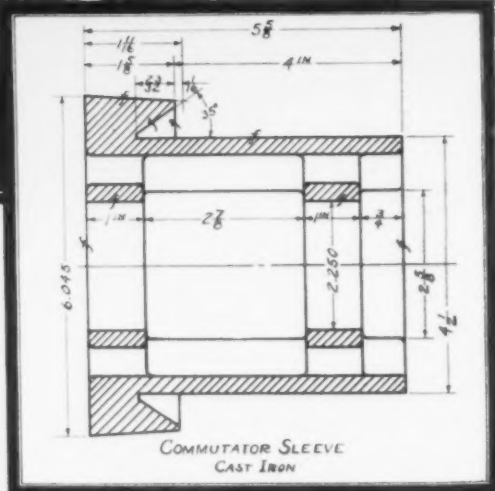
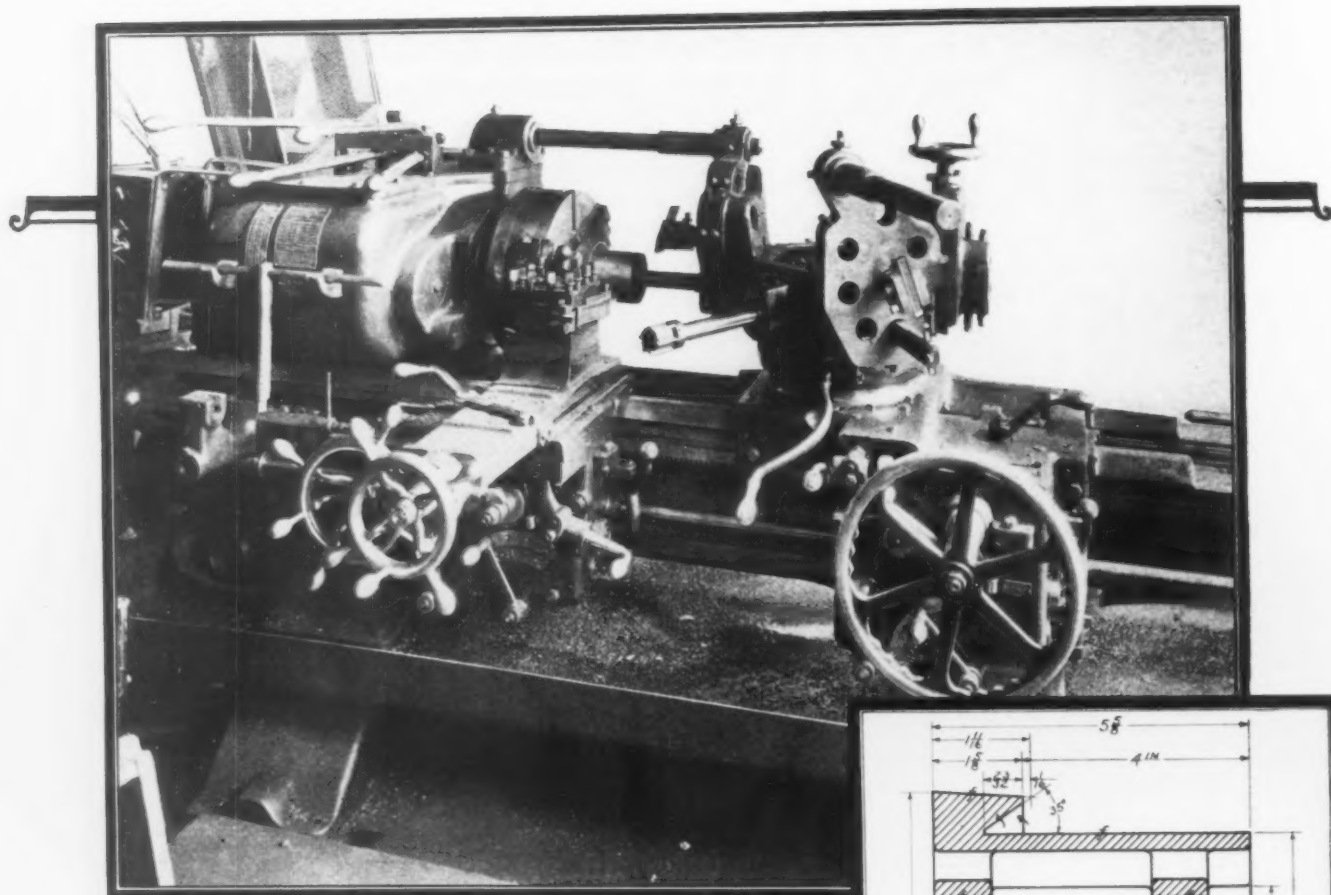
* * *

New hardness tables offered, one for determining the hardness of sheet metal by the use of the 5-mm. ball when the material is too thin to test with a 10-mm. ball.—Page 932.

* * *

Few of the commercial alloy steel castings on the market, author asserts, will, when annealed, exhibit properties comparable with 0.30 per cent carbon steels that have been properly quenched and tempered.—Page 915.

It Pays to Replace Obsolete Turret Lathes with Modern W & S Machines



A prominent manufacturer of electric motors replaced two old type turret lathes with a new W & S 2-A machine, averaging a saving of 68% on three jobs previously done on the obsolete machines.

The photograph illustrates the set-up for one job--a commutator sleeve, on which the machining cost was reduced from 53c to 15c.

The Warner & Swasey Company

Cleveland, Ohio, U. S. A.

THE IRON AGE

New York, October 2, 1930

ESTABLISHED 1855

VOL. 126, No. 14

Metal Etching An Art Entering Into Wide Use

ETCHING metals such as brass, bronze, nickel silver, aluminum and its alloys, and more recently the high chrome nickel alloys of steel, has developed in the past few years into the handling of large decorative panels which would have amazed the artists of the fourteenth century, who first used the process of destroying metal to produce a design.

For the larger work, as well as in such products as identification plates, signs and clock and meter dials, the combination of camera, protective coatings and immersion in acid have replaced the etcher's pencil so that the original drawing of the architect or designer is accurately reproduced to the minutest detail.

Sensitized with a coating of albumen, a zinc sheet of about No. 5 to 7 gage is locked in a printing frame with the negative, and the design to be etched on the metal is transferred by the light of arc lamps to the surface of the sheet. On small and medium sized designs,

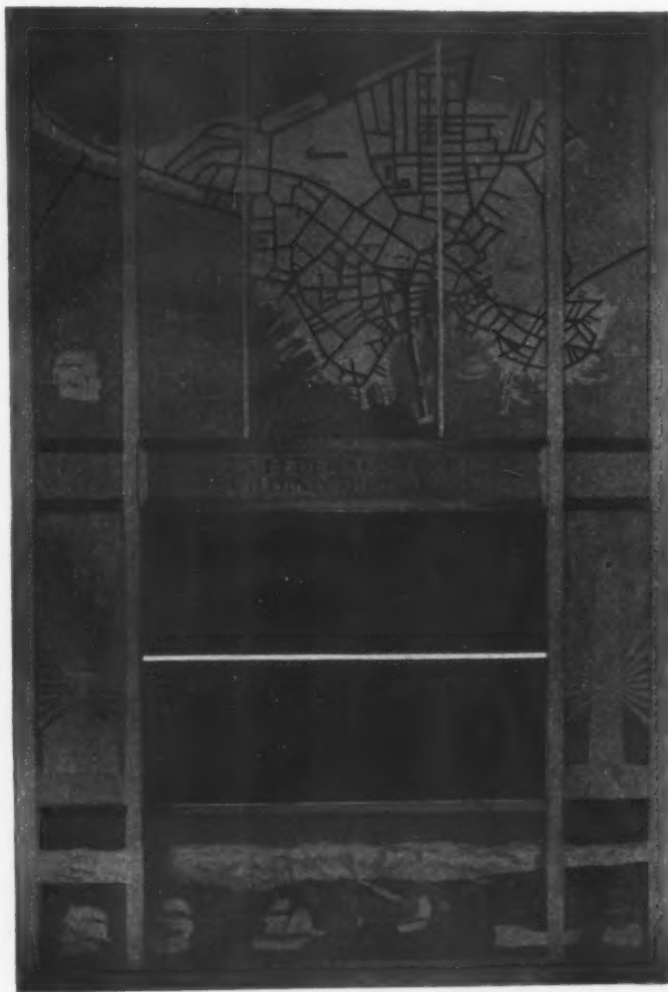
the camera provides the negative, but in handling a large panel, 2 or 3 ft. wide and 5 to 7 ft. long, special methods are required. The negative required is built up from large strips of transparent photographic film

on which the drawing to be reproduced is traced. The artists work on a glass-topped table, lighted underneath, tracing readily all the details of the original drawing.

While black ink is sometimes used for the purpose, the Etched Products Co., Long Island City, has found an opaque red particularly suitable, as it does not scale or chip when dry. The opaque red is also used by this company for retouching the negative, covering any pinholes or hairlines that may appear in the photographic film, when the camera is used.

Special Frame for Large Panels

Large panels are placed in a vertical printing frame, which will accommodate sections up to 4 x 8 ft., while two arc lights print the negative on the sensitive zinc.



The bronze bulletin board in the main lobby of 75 Federal Street, Boston, demonstrates the intricacy of design which may be etched in metal

The smaller products moving along the regular line of production are usually placed in a horizontal frame with a sheet rubber backing, which may be inflated with an air pump, forcing the negative and zinc plate firmly together. With the smaller frames, a single arc lamp is usually sufficient.

When the zinc plate has had the required exposure, it is placed in a lithographic flat-bed cylinder press, or, in the case of 7-ft. panels for doors, in a newly-developed flat-bed transfer press, power operated. Here, the design on the zinc plate is printed with

metal is done, the plate is immersed in the etching vat and washed in a cleaning bath a number of times for 10 to 15 min., depending upon the metal and the depth of the design. The washing after the acid bath arrests the action of the acid. If permitted to remain in the vat too long the acid would tend to eat too deeply and undermine the design. The washing or cleaning solution used to suspend action of the etching acid usually consists of 1 lb. of sodium or potassium bichromate, $\frac{3}{4}$ lb. of oil of vitriol (sulphuric acid) and 3 $\frac{1}{3}$ gal. of water.



asphalt ink on the metal to be etched.

The metal bearing the design is then dusted with one of various compounds used in providing a protective coating to the parts of the plate not intended to be eaten by the etching acid. Dragon's blood, rosin, beeswax and an acid are used in certain compounds and others are composed of beeswax, Gilsenite and an acid. Gilsenite is a brittle asphalt used in the form of a brown powder, which when warmed becomes plastic and provides protection against acid.

In Bath for Short Period

When the powder has been dusted on the plate and brushed off, except where it adheres to the ink on the design, the plate is passed through a furnace on a conveyor and the powder fuses with the ink, providing a strong protective surface for the design.

In the department where the actual etching of the

These elevator door panels in the Richfield Oil Building, Los Angeles, were etched on ordinary furniture steel by the Etched Products Co., after which the fabricator of the doors, the A. J. Bayer Co., Los Angeles, had them nickel plated, with a satin finish

The metal-removing acid used for the etching varies with each plant and with the metal being etched. The acids for brass, copper and zinc differ completely from those used on aluminum, ordinary cold-rolled steel, or the high chrome-nickel steels. Monel metal is

etched with a solution of nitric acid. For the steels and aluminum a usual solution for etching is perchloride of iron, obtained by adding soft iron borings or shavings to 480 lb. of muriatic acid until reaction ceases and ferrous chloride is obtained. To this saturated solution is added 60 lb. of nitric acid at 42 deg. Baumé and then 180 lb. of muriatic acid at 20 deg. Baumé. Hydrofluoric acid may be used for etching rustless or stainless steels, but its action is very rapid and the fumes are dangerous.

After etching, some of the metal remains in solution. This is precipitated by adding iron in the case of copper in the solution, or nitric acid when steel

has been etched. The solution is then reoxidized.

While certain etching shops find it more satisfactory to purchase their perchloride of iron ready for use, disposing of the acid when its usefulness is ended following a certain amount of etching, this practice is usually adopted by plants doing only a minor amount of metal etching. The Etched Products Co. has found by experience that compounding of its own solutions of perchloride of iron is more economical and with the necessary materials available the etching acid is left in the vats from day to day and rejuvenated by the addition of muriatic acid, soft iron borings or shavings and nitric acid.

With the etching completed to the required depth, the resistant inks are removed by washing the article in Volinine, a solvent of gasoline, after which it is thoroughly cleaned by immersion in sawdust to clean and dry the surface. Maple sawdust is widely used and oak is carefully avoided because of the tannic acid in the oak sawdust. As a final precaution against corrosion, all the etched metals, except high chrome-nickel steel, receive a lacquer finish, to preserve the metal from tarnish for various periods. Such protection is unnecessary with rustless steel. An exception to

the lacquering method was a number of elevator door panels recently made by the Etched Products Co. for the Richfield Oil Building in Los Angeles. Ordinary furniture steel sheets were used and after being etched were nickel plated.



Aluminum lends itself readily to etched designs. This door, entirely of aluminum, was fabricated by the United Metal Products Co., Canton, Ohio

When coating with colors, rustless steel is treated similarly to the other metals. The part of the design not to be colored is covered with asphalt paint and the entire product is sprayed with the required lacquer. This adheres firmly to the uncoated portions of the metal and the asphalt painted sections as well, but

washing with a solvent of asphalt removes the coated asphalt sections and leaves the lacquer only where it is adhering directly to the metal.

If a two-color design is required, the second application is made after covering parts of the design with tape, leaving exposed only the parts to be colored. This

is done before the final washing off of the asphalt paint.

The lacquers used give a heavy enameled surface, which offers considerable resistance to the normal wear occasioned by necessary polishing of the raised metal portions of a design. Proponents of high chrome nickel alloy steels claim that this polishing and wear on the lacquered background of a panel is greatly reduced with the corrosion resistant alloy.

If no color is to be used, it is customary to oxidize or change part of the background of the design to a tone of gray with lead acetate, which brings out the design more strongly. This oxidation is sometimes used in combination with the sprayed lacquers, providing the effect of an additional color in the design.

While modern decoration has brought the metal etcher to the fore as an important contributor to the attractiveness of the lobbies in the great business and apartment structures of today, the future promises him a still more important place. Now it is the doors, bulletin boards or special panels for the interior, which are etched and colorfully lacquered. In the not distant future, however, with metal being increasingly used for exterior decoration,

and all-metal faced structures seriously considered, the etched panel for exterior use on and near the street level appears to offer an additional demand for the work of the etcher in metals able to handle large individual pieces.

AIDED by the camera, oversize printing frames and transfer presses, special ovens, acid solutions and lacquers, the metal etcher is

accurately reproducing the intricate designs in steel and non-ferrous metals required for decoration of modern office and apartment buildings.



Is the Small Plant Out of the Running?

"No," says F. J. LYNCH, president of the Sun Tube Corp., of Hillside, N. J., and he ought to know, because his plant is turning out an annual volume in excess of \$750,000 from a total plant area of 7500 sq. ft.

"Too much capital is worse than too little, because dollars cannot take the place of brains. Too much room in a plant encourages waste of materials and motions. There is no place in our plant where one could swing a cat around his head if he had any regard for the cat.

"A small plant scientifically organized, with the proper experience in the field and with a good development department, has the necessary essentials for successful competition with units of any size.

"A small organization is in close contact with its market, supervision is more immediate and personal, ability can be quickly determined, and mistakes recti-

fied promptly. By offering the proper incentives, results can be secured against any competition.

"In the last analysis, one skilled workman is comparable with another, as is a skilled engineer or executive. Performance is dependent on intelligent effort and the specialist in the small plant has nothing to fear from the big organization."

* * *

In the following article, Mr. Lynch describes some unique and effective methods of organization and operation that have been applied in his plant.

Frank Lynch

Squeezing Gold Out of Tin

By F. J. LYNCH
*President,
Sun Tube Corporation*

I HAVE been asked to tell the readers of THE IRON AGE something about our methods of management and organization. The question put to me to answer is this, "What factors have enabled you to keep running full time on a three-shift basis all through the business depression?"

First let me say that our industry as a whole is not prospering. The consumption of collapsible tubes for tooth paste and shaving cream is, to put it mildly, no better this year than last. In running 50 per cent better than last year in production volume, as we are, we have been characterized as being fortunate. If fortunate means being lucky we must disclaim this term. Luck does not play much of a part in a highly competitive industry.

There are a number of different factors which have combined to keep our plant going to capacity. No one of them alone would have been capable of doing it, but properly hooked up to pull in unison, they have produced unusual results.

The more important of these factors are as follows:

- 1—A rigid product standardization
- 2—A somewhat unusual sales policy
- 3—Disregard of fixed ideas in production engineering
- 4—Development of competition between apparatus units
- 5—A radical obsolescence policy
- 6—Incentives to indirect labor
- 7—Extension of executive responsibility

Take factor No. 1, rigid product standardi-

zation. We make four sizes of tubes only. This is to the customer's advantage as well as ours, since it enables us to serve him more rapidly and economically than if our plant were cluttered up with a confusion of different sizes. Also, of course, from our own operating standpoint, this is a great asset. Specials are "out." If a customer wants us to serve him, he must take what we offer. This is not a sales handicap; on the contrary, I have found it to be a help.

Carrying the idea a bit further, we insist on minimum requirements from our customers of 3 days work on a unit, or 1000 gross of tubes. We do not believe in small lots as "overhead carriers." The best overhead carrier is a steady production quota of big lot business. Operating on this policy we have been able to carry an average booking of orders for two

years ahead, with some running to five years. We sell our customers on the sound idea that long term business of this kind enables us to make investment in improved equipment and in development work in which they share the benefits of cost reduction or quality improvement. Short term contracts would not give them this advantage.

Operating on this sales principle, which is based on sound production practice, enables us to sell our product without employing salesmen. We operate with less than ten accounts and usually have a waiting list.

Another production factor which forms a strong selling point is a quick production cycle. Ours is 50 min. from raw material to crated

HERE is a company that does not recognize the word "depression."

Its production is running 60 per cent ahead of last year, in an industry which, as a whole, is not exceeding last year's volume.

It is operating three shifts full time, and has been doing so ever since the stock market crash.

It has increased wages of skilled help within the last sixty days, pays 53 weeks salary for 51 weeks work and gives ten-day vacations.

It has orders booked for five years in advance, with an average booking of two years ahead.

Its machine replacement policy is such that in four years the obsolescence account has equalled twice the capital stock value.

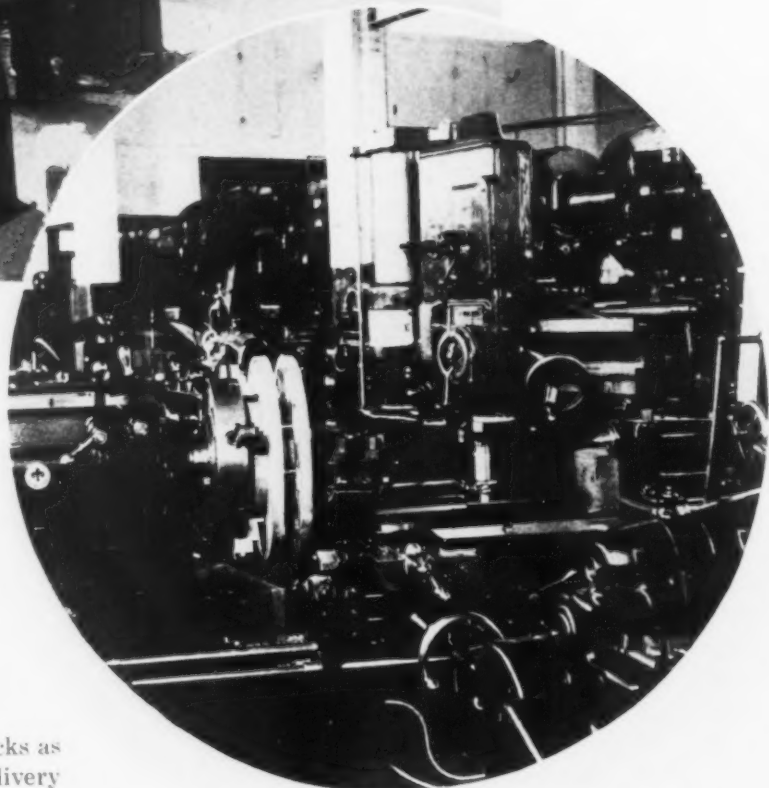
It makes collapsible tubes for tooth paste and shaving cream, using special production machinery throughout the process, yet standard machine tools constitute one-third of its total equipment.

Its methods of management and its operating policies are so unique that we have invited Mr. Lynch to tell us about them.

JOHN H. VAN DEVENTER,
Industrial Consultant—THE IRON AGE



APPROXIMATELY 33 per cent of all of the equipment of the plant is represented by machine tools, in spite of the fact that no machine tools are employed in production. Capacity for immediate repairs, tool making and machine construction are considerations responsible for this condition



finished product. This reduces our customer's stocks as well as our own because we can always make delivery in short order when called for. We aim to hold our finished inventory as not to exceed one and one half hours' production, and generally succeed in so doing.

We fight against the deadening influence of precedent in our production through the instrumentality of aggressive development work. Every one of our principal men is taught to keep his mind open for new ideas. A large part of the energy of the organization goes into the development of new apparatus. That is the reason why we, who do not use machine tools at all in our process of making tubes, nevertheless operate a machine shop which represents about one-third of our entire equipment investment. Of course, in addition to building our own machines and tools and dies, we use this for making repairs also. Minutes count when continuous production is concerned.

We believe in making machines compete with one another as well as men. Therefore we have no one way to make our product. Instead, we have three different processes or production units, as we call them in operation at the same time. One of these is what we call the specialized automatic unit, another is the semi-specialized automatic; the third is a variable

automatic. Each of these hook-ups has certain advantages. The winning group, or unit, over a period sufficiently long to be a fair test, will make the other two obsolete.

This policy has led to some rather unusual ideas concerning obsolescence. In the past four years our equipment replacement account has amounted to twice our capitalization. Our machines do not get time to wear out under these circumstances. They are thrown out.

We believe in minimum plant and maximum production. When there is too much room in the plant, wastes creep in that are difficult to locate and eliminate. Our machine spacing is very close. We utilize not only floor space but overhead air space as well. Our conveyor system makes it possible to do this effectively. Motor drive on most of our equipment does away with overhead belts and makes the overhead drying oven system feasible. The same square foot of floor space that serves an extrusion press or an automatic printing unit also serves a drying oven. There is no place

in our plant where one could comfortably swing a cat around his head, if he had any regard for the cat.

As a result of this intensive use of floor space and overhead area, we are able to complete and ship a valuation of product of about \$750,000 per annum from a total floor area of 7500 sq. ft. This area includes receiving and shipping departments, office and engineering departments, toolroom and machine shop as well as production units.

Our organization is such as to emphasize the value of indirect labor as contrasted with direct labor. We employ machine operators, of course, who fall in the latter category. Their work however is mainly restricted to pressing buttons on machine control apparatus. It is our particular purpose to devise machines and methods which will make the product mechanically perfect insofar as this is humanly possible. We have a system of inspection which gives a check up on each operation at 30 min. intervals. But the machine operators do not function in this.

We have little confidence in the ability of unskilled labor to differentiate between good and bad quality, and indeed,

very little confidence in the value of unskilled help. Therefore all of our incentives are applied to indirect labor which provides the brains and initiative and shoulders the responsibility for output and quality. Our development toward automatization tends to continually reduce the proportion of direct labor. Four or five girls now take care of a unit of output which formerly required fifteen.

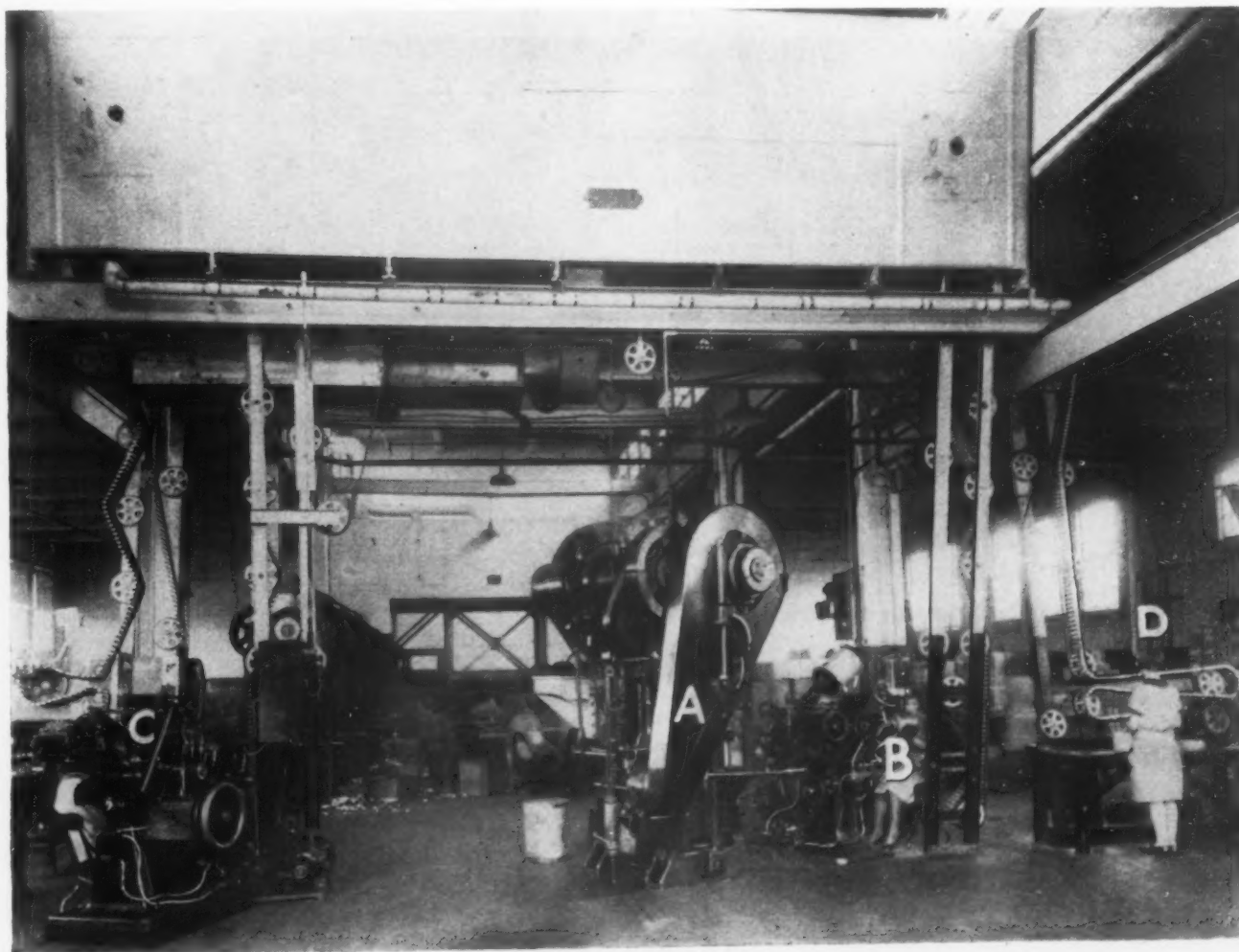
We pay our direct labor straight day wages, basing them on the prevailing rate in the district and raising them periodically at fixed intervals for two years, at which time the maximum is reached. No incentives are paid to direct labor.

Before telling about our incentive plan for indirect labor, I must sketch an outline of our organization.

▲ ▲ ▲

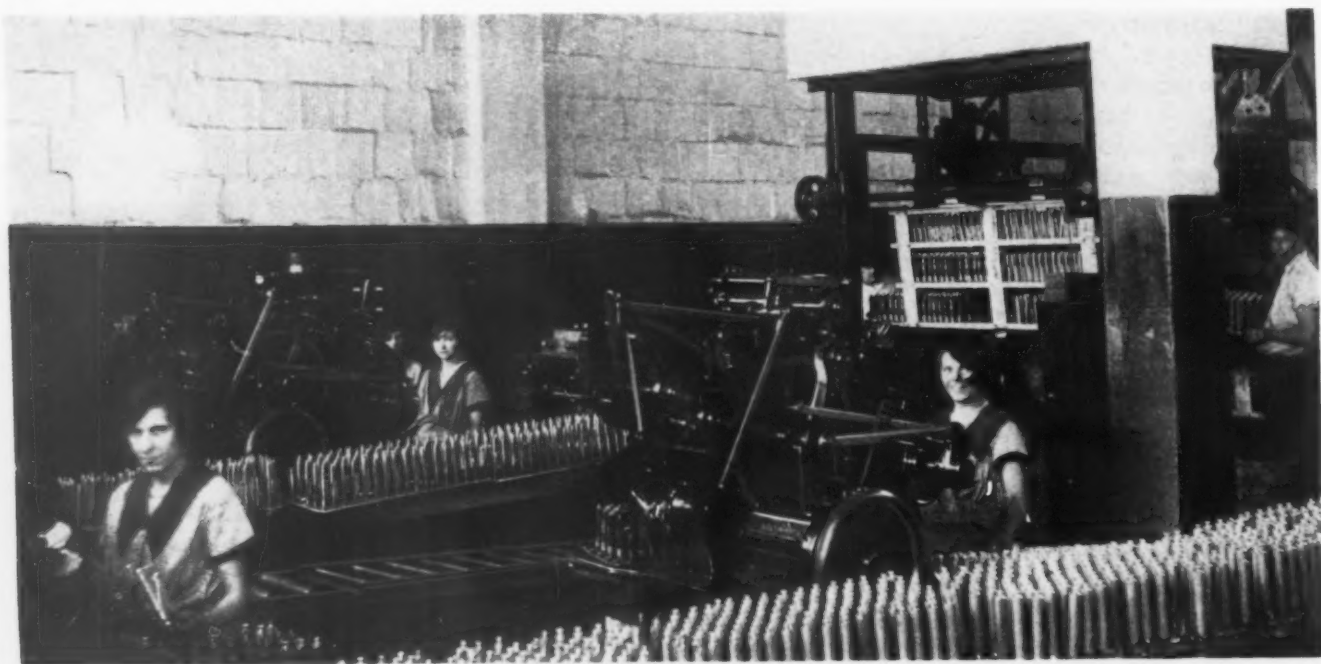
ONE of the automatic units for making collapsible tin tubes. A, shows the extrusion operation. The tubes feeding by conveyor into automatic machine B, wherein neck is threaded, tube is trimmed to length, cap with the cork inserted is screwed on to tube. Coating, ejection of tube and scrap, follow in turn. They are then elevated by conveyor into a Y oven, and dried. They next come down to printing unit C, label is printed, and pass into the other leg of Y oven and dried, descending to unit D for crating. Fifty minutes from tin slug to crated tube, ready for shipment.

The chief operating executive is trained as a tool maker and machine designer. The vice-president in charge of engineering is also an extool maker and machine designer. So also are his two assistants. Any one of these principal men can perform any operation, if necessary, either in construction or operation. There are two groups of



indirect labor emanating from this central supervisory group. Each of them is in charge of an engineer, his assistant and a junior. Each of these men also can, in emergency, do any work that may be necessary in connection with machine failure. Assistants and juniors are trained to perform the functions of their principals. Our overtime shifts are supervised by them, which not only develops them in shouldering responsibility but also gives us practically no overhead

Every increase of 500 gross during a period of 22 days calls for a 25 per cent increase in this bonus, and the establishment of the next regular bonus based on the 500 gross increase. As a result of this system, we have attained an actual production of 72 per cent of the theoretical capacity of the plant. Our method of compensation enables a good man to earn as much as \$4,000 a year, and the more he earns, the better we like it.



MACHINES and processes compete for survival. This semi-automatic printing unit is competing with the full automatic unit shown at C in Fig. 1. The winner will make the loser obsolete

A SYSTEM is employed of developing juniors for every important principal. Chief Engineer John H. Friden and his junior

on these shifts, since this same organization would be employed if we ran but one.

One of the two indirect groups or divisions referred to above consists of tube mechanics who build the tools and control the operations on the automatic extrusion units. The other group or division is detailed to the work of machine construction and improvement.

The men in these two groups, forming our indirect labor, are the bonus men in production. They are also paid a salary of 53 weeks per year for 51 weeks work. This allows for a ten-day vacation, with pay, which comes annually the week preceding Labor Day. In addition, a bonus is paid them when the quota of production established on a machine-minute basis is equalled.

When the men in this first division or group have idle time on their hands, they aid the construction mechanics in the second division. This is in line with the principle of flexibility which we develop to the utmost.

In line with this versatility, an instance may be cited. Recently, the president, chief engineer and production superintendent were forced, through an accident, to remain away from the plant for some days. The juniors moved up the line, took over supervision automatically, and production went on as usual, in fact a record was broken.

The bonus plan is a stimulus toward this sort of cooperative effort, and carries it all along the line.

If a man fails to report for a shift, he notifies his junior, who functions for him. In production such as ours, and particularly on three shifts, dependability is essential. Every important man is taught to be an executive. He can procure raw material, provide shipping facilities or take care of any item necessary for production.

These are some of the factors which have been of service in keeping our plant busy. They have enabled us to give the kind of service and the quality of product that maintains consumer demand in bad times as well as good.

Half-Million-Volt X-Rays

X-RAYS at 500,000 volts, more than twice as high a voltage as is being used in today's most powerful therapy tubes, have been attained by Dr. W. D. Coolidge, associate director of the General Electric research laboratory at Schenectady. Such a decided increase in voltage, and hence increase in penetrating power of the rays, was made possible by a system of "cascading" the tube, an arrangement devised by Doctor Coolidge in his work with high-voltage cathode-ray tubes.

Doctor Coolidge has announced that another X-ray



***H**IGHLY skilled die maker engraving the die for marking the shoulder of a tube.*

The assistant chief engineer (below) inspecting a remarkable automatic machine. This feeds tube into the machine, cuts the thread, cuts a cork for the cap, corks a cap, caps a tube, ejects the trim scrap, cuts up the cork scrap, coats tube with lacquer, ejects the cork scrap and ejects the coated tube. It stops and starts on remote control.

tube is being developed, to operate at 900,000 volts. The 500,000-volt X-ray tube is built in two sections.

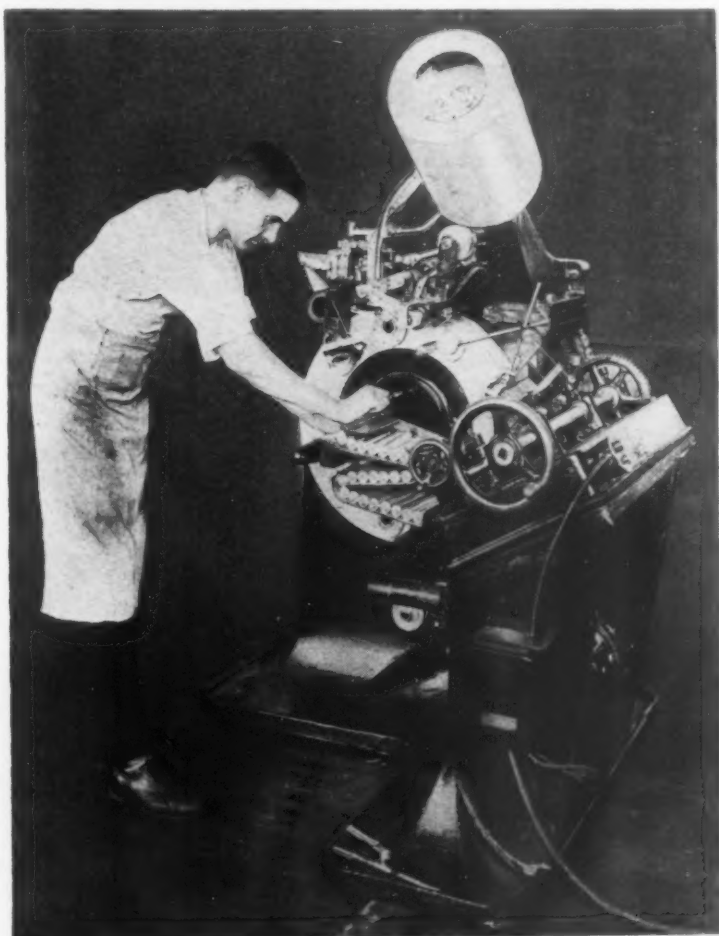
In his previous work in cathode-ray tube development he found that tubes can be built for very high voltages by the use of a cascade (or sectional) system, and that by this method there appears to be no limit to the voltage which can be used. The target replaces the "window" of the ca-

thode-ray tube so that, instead of cathode rays being emitted by the tube through such a "window," X-rays of exceedingly high penetrability are generated by the impact of the electrons (or cathode rays) on the target.

At present the highest-voltage Coolidge X-ray tubes used commercially are of 200,000 volts peak capacity. These are of two types—water-cooled and air-cooled. Both are adaptable for X-ray therapy. The air-cooled type has been used to considerable advantage in industrial applications of X-rays, since the high voltage gives the necessary penetration required for examining the heavier metal objects. Industrially, higher voltages would permit radiography of thicker metals, and would shorten time of exposure.

Instruments for Measuring Surface Temperatures

IT is much more difficult to measure the temperature of a surface, such as that of a hot stove, than that of a liquid or of the air in a room. There are times when it is necessary to measure the temperature of a hot surface, such as that of a piece of metal which is being heated, or of a heated roll, used in drying paper. The October number of the Bureau of Standards *Journal of Research* contains a description of instruments which have been used successfully in measurements of this kind.



Getting the Most Out of Steel Castings

By H. A. MITCHELL
Chief Metallurgist, Bonney-Floyd Co.,
Columbus, Ohio

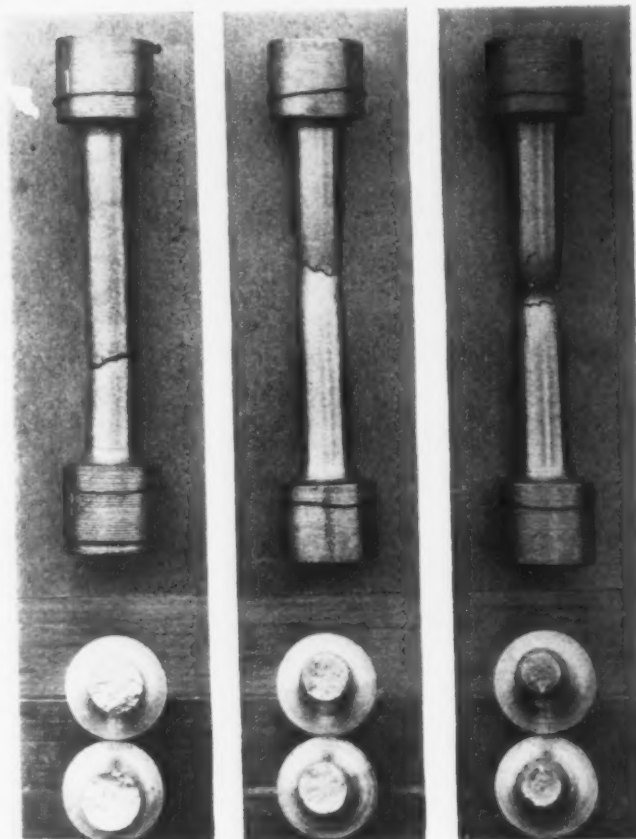
with normalizing (air-cooling) or normalizing and drawing for such treatment, although an improvement over ordinary annealing, falls quite short of the re-

SINCE the birth of the steel casting industry there has been a natural evolution in the improvement of methods, processes and equipment for the production of this commodity but the inherent qualities, for example, of a mild steel casting of today are not widely different from a corresponding one of the early converter days. By proper heat treatment, however, the properties of such a casting can be remarkably improved. It is true that we have entered an era of alloy steels and with them has come a corresponding increased value to the consumer but, where at all possible, both alloy and plain carbon steel castings should be heat treated by quenching and drawing to give the fullest value in physical properties.

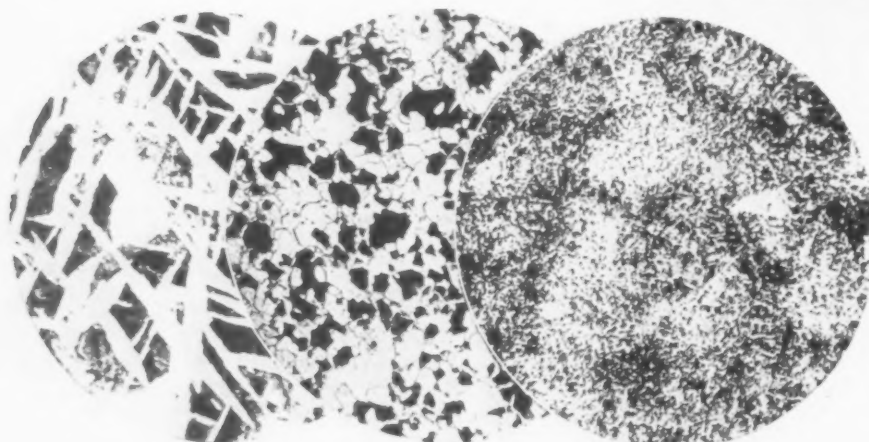
Quenched and Tempered Castings Advocated

Heat treated plain carbon steel has properties equal or superior to many types of annealed alloy steel castings. By heat treatment is meant a quench in some liquid medium from a temperature above the critical range followed by a tempering at some temperature below that point depending upon the use to which the particular casting is to be put. This treatment applies to the common carbon steels as well as the more expensive alloy steels.

This method of heat treating should not be confused



From left to right are shown test bars and photo-micrographs of unannealed, annealed and heat-treated carbon steel castings. The physical values are also given for each. Magnifications are of 100 diameters.



Ultimate strength.....	74,800	75,650	84,200
Yield point.....	37,500	42,000	57,400
Elongation in 2 in., per cent....	19.5	25.5	31.5
Reduction of area, per cent.....	29.0	44.0	65.0
Brinell	156.0	143.0	160.0
Izod	17.0	21.0	44.0
Endurance ratio.....	0.40	0.44	0.50
Analysis:			
C—0.30	Mn—0.79	P—0.030	S—0.026
			Si—0.33

sults obtained through heat treating by quenching in a liquid medium followed by a draw treatment.

When the first steel castings were made, they were used just as they came from the mold without any subsequent reheating. As soon as some of the progressive users became aware that annealing would



One of the several heat-treating units, including quenching tank

make their castings more useful, the demand was made that such be done and quite often in those days a hot ladle served as the annealer. Today the unannealed casting is a rarity and as soon as the buyer of castings realizes that the step from annealing to heat treatment imparts far more improvement than the step from the unannealed to the annealed state, the annealed steel casting will also become a rarity.

Effect of Various Heat Treatments

For comparison, take a 0.30 per cent carbon steel casting. This casting, after going through the normal procedure of being allowed to cool in the sand mold will have physical properties of the values shown in column one of table on page 917. After annealing, these properties will be as shown in column 2 and by quenching and tempering the same casting we may obtain the spread of properties as shown in column 3.

The results shown in this table are the average of 80 tests made from 0.30 carbon basic open-hearth and acid electric steel heats and vary only slightly in analysis. All tests were taken from 1¼-in. sq. bars and were annealed or heat treated as such and subsequently machined. Tension test

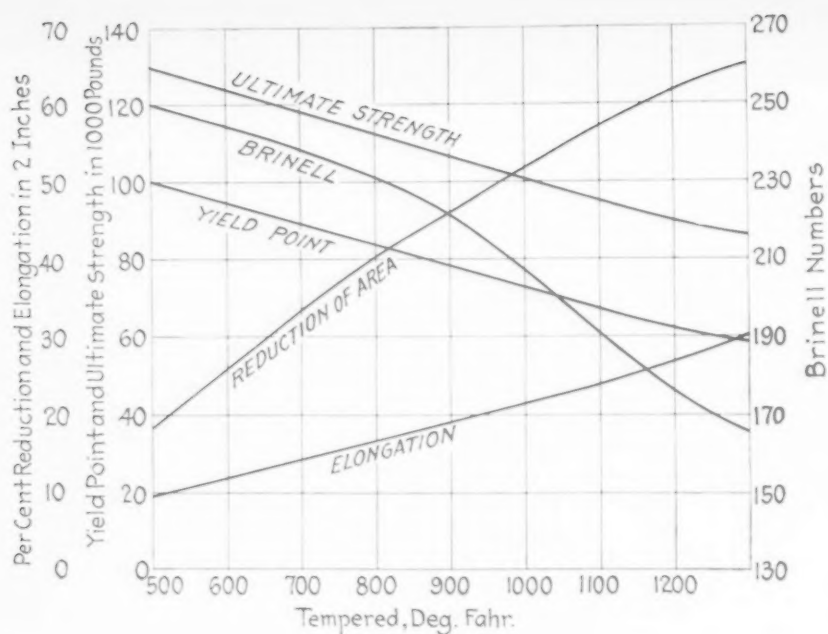
specimens together with photomicrographs and test results of three typical bars are reproduced.

Let us compare the improvement from the unannealed to the annealed and to the heat-treated state as evidenced by results shown with the photomicrographs. The heat-treated casting in this case is a typical one to replace the formerly annealed casting, having been quenched in water from 1650 deg. Fahr. and tempered at 1300 deg. Fahr. The percentage changes are based on the unannealed results as unity. We observe the improvements in table on page 917.

It is to be especially noted that the Brinell hardness in this case is increased 17 points over the annealed condition and yet the machinability is even better due to uniformity of structure. This fact is borne out by machine shop tests on a production basis.

In the alloy steel class, heat treatment is of even more importance. When the purchaser spends a little more money for an alloy steel casting, he expects considerably more strength and service. This he does not get from an annealed casting and only through a careful and accurate heat treatment can satisfactory results be obtained. As a matter of fact, there

BY "heat-treated" steel castings the author of this article means quenching and tempering as distinguished from annealing. It is claimed that the best properties of either plain carbon or alloy steel castings can be brought out only by quenching and tempering. He makes a strong plea for such treatment and states that it is no more logical for the consumer to avail himself of only part of the potential value of the steel casting by using it in the annealed condition than it is to operate a machine tool at reduced capacity when full capacity is available. Type of casting is no hindrance if proper equipment is available and if rules which he suggests are followed.



How the properties of carbon steel castings are affected by tempering

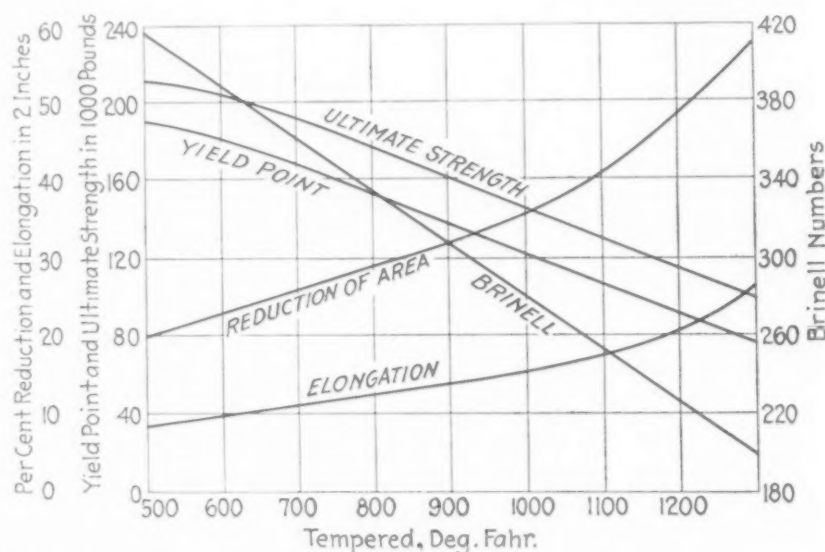
are few of the commercial alloy steel castings on the market which, when merely annealed, will exhibit properties comparable with the heat-treated 0.30 carbon steels in the table. Charts showing properties of typical heat-treated carbon and alloy steel castings are also reproduced.

The reader may question the hazards connected with or the advisability of quenching large and intricate castings or those with much variation in section. In answer to this we contend that with proper equipment, control and skill in handling, the type of casting need not be feared. For example, at the Bonney-Floyd Co., Columbus, Ohio, with which the writer is connected, there is no limitation as to size or

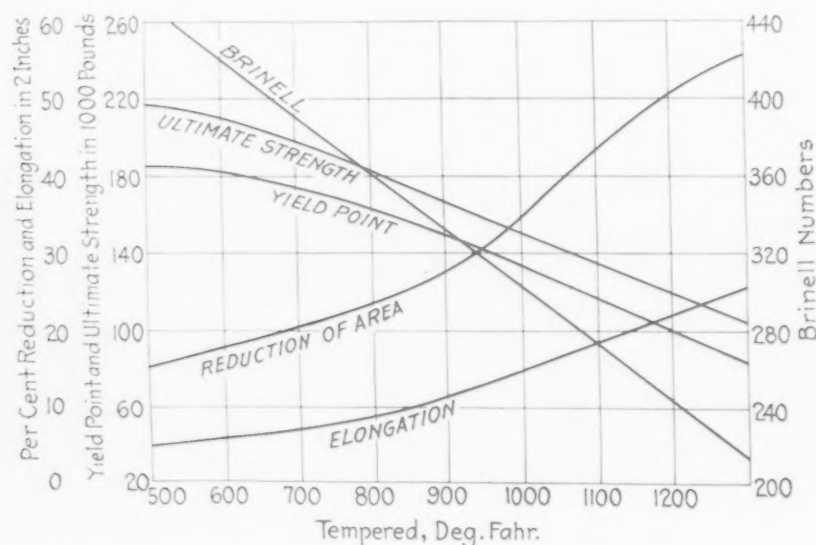
type of casting to be quenched except as the size is limited by the furnace equipment.

Danger of quench cracks is eliminated by observing a few important rules. First, the metal must be thoroughly refined before casting, which point applies especially to the harder types of alloy steels. Second, the charge or casting to be quenched must be absolutely uniform in temperature and, of course, the proper temperature previously determined for that particular analysis. Third, the temperature to which castings are quenched is very important.

To obtain satisfactory results day in and day out, it is necessary to have first-class equipment and absolute temperature control. One illustration shows one of several heat-treating units at the Bonney-Floyd Co. These particular units



How the properties of nickel-molybdenum alloy steel castings are affected by tempering



Properties of nickel-chrome-molybdenum alloy steel castings as affected by tempering

accommodate a casting or rack of castings having outside dimensions of 3 ft. by 5 ft. by 9 ft. One of the two furnaces is used for hardening and the other for tempering but may be used interchangeably.

The entire furnace, as well as the car top, is well insulated, thus insuring the least possible heat loss. It is fired with natural gas and equipped with automatic recording temperature control. Complete combustion, together with a non-oxidizing atmosphere, is obtained by a combination of proportional mixers and efficient burners. Due also to design of furnace and car, a circulation of hot gases is produced and a uniform temperature maintained. The door hoist and car puller are

remote controlled and may be operated either from the floor or from the overhead crane cage.

All parts operate so smoothly that the maximum time consumed for opening the door, pulling the car and immersing the load in the quench tank immediately adjacent is 50 sec. In this way the outer

parts of the charge have the least possible time to air-cool and corresponding uniform results are obtained. The racks upon which the work is loaded are handled by an overhead traveling crane, the hoist of which is equipped with a device which automatically grasps the rack when lowered. The output of one of the units as illustrated is about 16 tons of castings per 24 hr.

Any given type of steel casting in the annealed state shows practically the same physical properties regardless of its method of manufacture. The chief

TABLE OF PROPERTIES OF A PLAIN CARBON STEEL CASTING—
AVERAGE OF 80 TESTS

	As Cast	Annealed	Heat-treated
Ultimate strength, lb. per sq. in.	74100	75000	80000 to 125000
Yield point, lb. per sq. in.	37100	41500	50000 to 97000
Elongation in 2 in. per cent	19.5	24.5	30 to 10
Reduction of area, per cent	31.0	46.2	65 to 20
Brinell	160	145	155 to 250
Izod	16	20	48 to 15
Endurance ratio	0.40	0.44	0.50

CHANGES RESULTING FROM ANNEALING AND HEAT TREATING.
UNANNEALED USED AS UNITY

	Per Cent Change, Annealed	Per Cent Change, Heat-Treated
Ultimate strength	+ 1.1	+ 12.6
Yield point	+12.0	+ 53.8
Elongation	+30.8	+ 61.5
Reduction	+51.7	+124.1
Brinell	- 8.3	+ 2.5
Izod	+23.5	+158.8
Endurance ratio	+10.0	+ 25.0

difference between one casting and another depends on the care observed in molding and core making, heading and gating. By heat treating, however, the properties are so changed that the applications are multiplied many times.

It seems no more logical for the consumer to avail himself of only part of the potential value of the steel

casting by using it in the annealed state than it is to operate a machine tool at reduced capacity when full capacity is available. The value of scientific heat treatment for forgings was very early recognized by the automotive and other industries whose products were obliged to withstand high and repeated stresses.

It is here predicted that much the same enthusiasm will be shown for heat treatment by users of steel castings just as soon as they realize the greatly increased value that is imparted by this process.

THE Otis Steel Co., Cleveland, made the single steel casting here shown. It weighs 230,000 lb. and is 13 ft. long and nearly 7 ft. high. It will be an anvil base for a 12,000-lb. hammer being manufactured by the Alliance Machine Co., Alliance, Ohio, for the Taylor Forge & Iron Co., Chicago. The casting required six weeks in the foundry and three weeks for machining.



Strip Steel Annealed, Galvanized

AT the Riverdale works of the Acme Steel Co., Chicago, the main building contains a continuous hot strip mill and three batteries of box annealing furnaces. Other buildings contain hoop mill, merchant mill, cold mills and galvanizing plant. Heating and rolling equipment were described in THE IRON AGE of March 20, 1930, page 846.

One of the most interesting features in this plant is an installation which takes the strip steel and anneals, cools, pickles, washes and galvanizes it con-

tinuously, automatically and at a high rate of speed. This installation sets on two floors and there are 18 reels for the coiled strip to unwind from, which are located on the second floor.

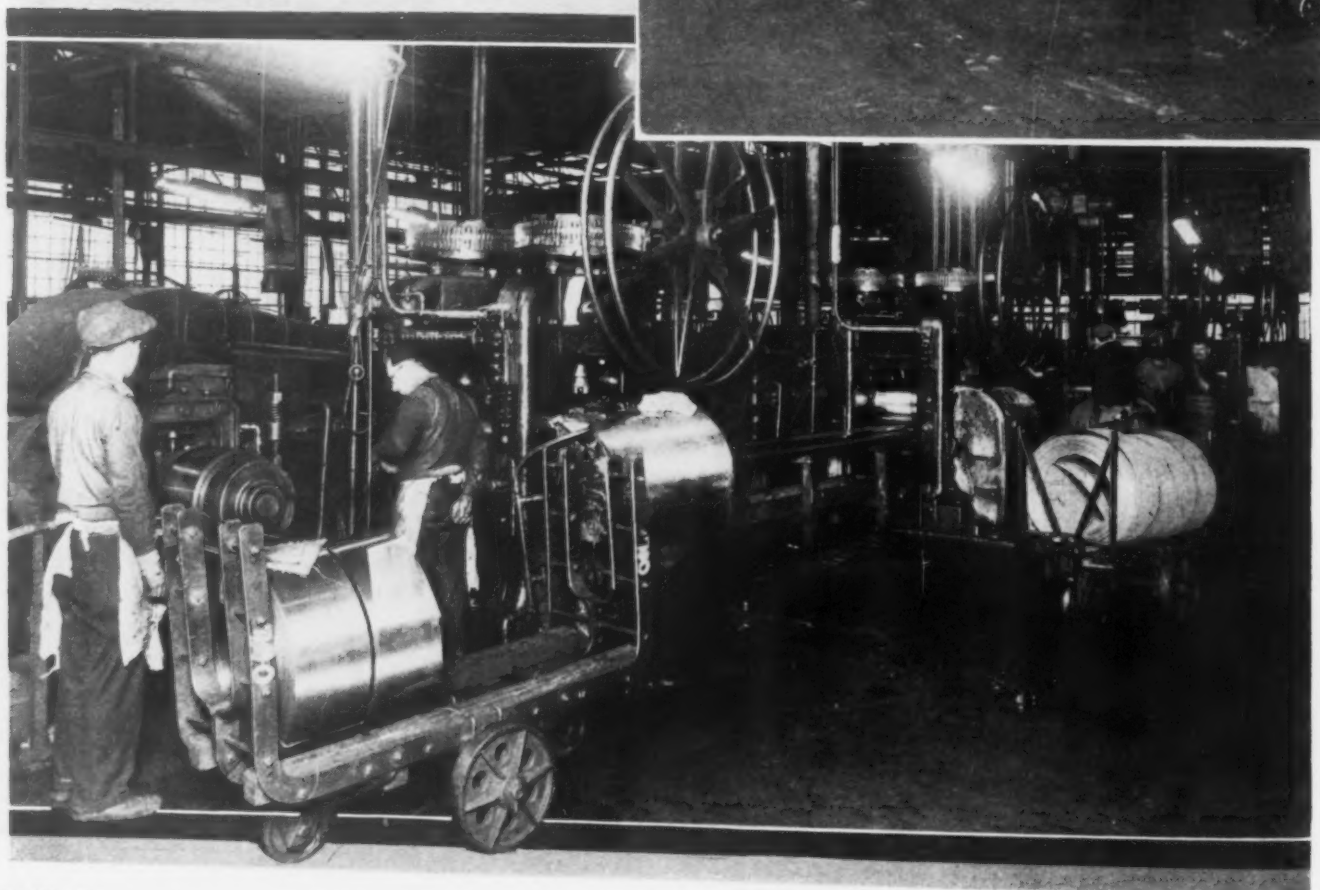
From these the strands of strip run through a gas-fired lead pot, where they are annealed. This pot or kettle is in reality a shallow pan of cast steel, 15 ft. long.

▲ ▲ ▲

CONTINUOUS Japan or paint baking furnace (at right) taking its product from lead annealing furnace in background. Strip steel passes through gas-filled horizontal pipes above furnace; thence through the paint bath, through wipers, through the furnace and to the floor below, to be coiled for shipment.

Coiler (below) taking strip as it comes from the finishing stand.

Continuous gas-fired lead annealing furnaces (next page) with temperature controls.



and Japanned Continuously . . .

4 ft. wide and 6 in. deep. It is fixed in a brick setting which acts as a furnace and is 19 ft. long, 6½ ft. wide and 4 ft. high. The furnace is steel incased and has seven tunnel-type gas burners located in two groups on the sides.

One long manifold serves the two groups of burners on one end of the furnace, those on the other end be-

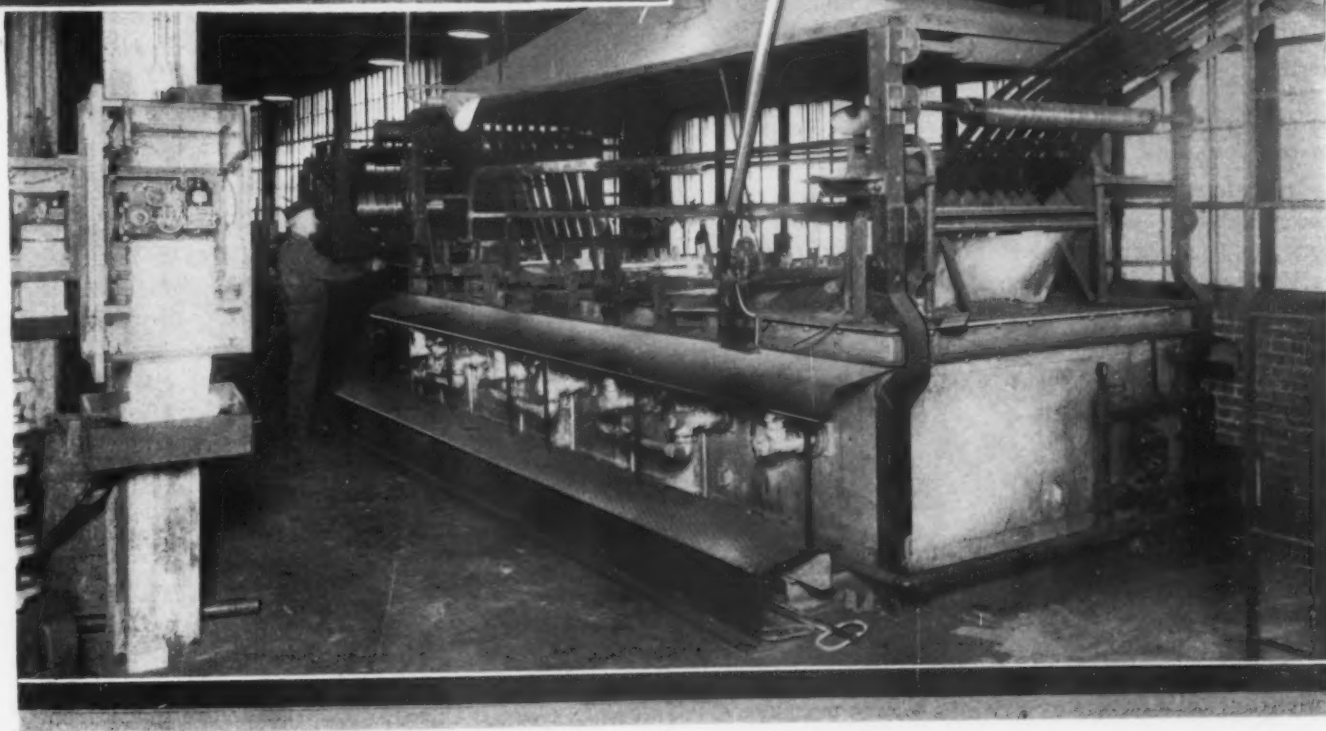
By J. B. NEALEY
*American Gas Association,
New York*

ing served similarly. To each burner is attached an inspirator or gas-air proportioner. The temperature of the lead bath is controlled with two automatic controllers each with a thermocouple in the bath and a recording pyrometer which gives a chart of the temperatures.

Lead Bath Can Handle Strips to Total of 36 In. Wide

This pan will hold 7½ tons of lead and a thin coating of coal screenings is used on top of the molten bath as insulation against heat radiation and slagging. Work up to 12 in. in width can be annealed in this pan, but the total width of all the work running through at one time must not exceed 36 in. The speed of the reels is so regulated that the work may travel through the bath at speeds varying from 8 to 50 ft. a minute. Another and similar set-up in this plant is used with an installation for japanning the work.

(Concluded on page 975)



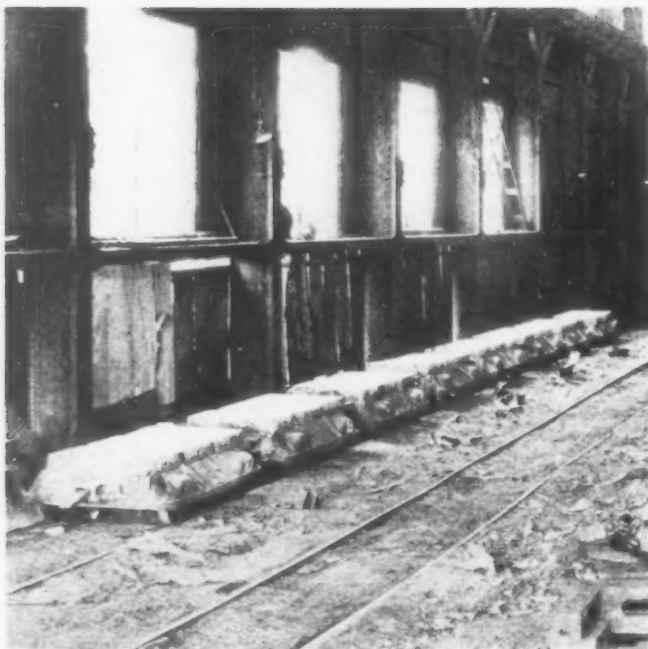


Fig. 3—Ingot Mold Stools Used for Top Pouring of Ordinary Ingots. Stools Are Mounted on Ingot Cars

Cast Iron or Steel Stools for Ingot Molds

By JOHN H. HRUSKA

Metallurgical Engineer,
Berwyn, Ill.

WHILE, in the commonly applied top pouring of ingots, the molds under normal conditions are merely exposed to thermochemical deterioration and while strictly mechanical effects are confined to a more or less static pressure and comparatively negligible friction between the slowly rising metal and the wall of the mold, the conditions for the mold stools are quite different. A stream of molten metal of a high specific mass falls from 6 to 20 ft. and even more under pressure of the steel in the ladle, first "hitting" the stool directly and subsequently eroding the stool metal at temperatures from 2550 deg. Fahr. upward. During the filling of the mold, the stool metal is naturally attacked chemically. These reactions are undoubtedly increased by the high pressure or weight of the solidifying ingot against the mold stool.

While, however, in judiciously used ingot molds the pressure against the mold walls virtually decreases during solidification, the weight of the metal upon the supporting stool remains in most cases a practical constant. The counteracting taper of the wall might relieve these stresses somewhat but, from actual observations, this influence does not seem to be of vital importance. This fact, contrary to the rules of hydraulics or statics, has been repeatedly noticed, especially when pouring larger ingots from the bottom.

In one instance, molds and stools designed for bottom pouring were intentionally made from

the same heat or ladle of both direct Bessemer iron and cupola melted metal. The behavior of both molds and corresponding stools was carefully checked after each heat teemed. Maximum mold erosion has been observed at about two-thirds of the height of each mold, but a still more pronounced deterioration was discernible at the whole upper surface of the stool where, contrary to top pouring, the effects of the impact of molten steel may be disregarded.

Besides the influence of continuous pressure of the ingot against the stool, a quicker thermal deterioration seems to accompany the above mentioned effects, thus even affecting the surface hardness of the stool metal. Hence, the tendency of some American, European and Asian steel works to specify entirely different metals for stools as compared with the corresponding molds.

Alloy Iron or Steel for Stools

So far, it appears to be the cheapest practice to make stools and molds from identical iron or identical heats. When analyzing the life of really useful stools in comparison with molds, one is often surprised as to the discrepancies and variations of similar observations. Perhaps the closer attention given to this matter in connection with better steel, lessened delays, speedier stripping and other items may account for the fact that instead of the well known routine to use identical iron for molds and stools, the latter are made from

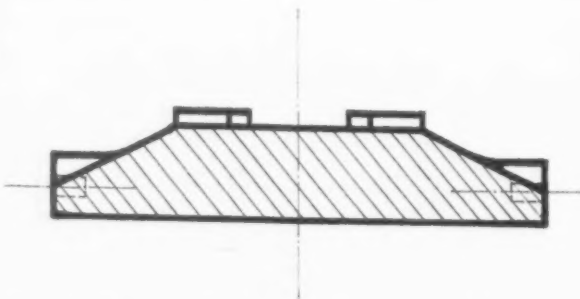


Fig. 1—Ingot Mold Stool Used for Top Pouring of Ordinary Ingots. Material: Cast Iron

either alloy gray iron or lately from alloy cast steel.

In many plants remarkable savings have been experienced due to this practice. In order to abbreviate a detailed description of these metals used in various plants and countries, the table on page 975 presents a summary of the iron used as stool metals.

Judging from this compilation, it is evident that the higher price to be paid for the stool metal is favorably balanced by a much longer service of the stools, which in turn decreases scrapping costs, labor, turnover of materials, clerical work, etc. With this in mind, many executives with vision realize the possibility of real savings by introducing better and more reliable materials for ingot mold stools.

Thermochemical Deterioration and Life of Stools

While in teeming and cooling, the chemical reactions between the stool metal and ingot steel are undoubtedly very much alike as between the mold wall and ingot, there has been noticed a marked increase in the speed of surface reactions between stool and solidifying steel. The surface layer of the oxidized or decomposed metal is in many instances 30 to 80 per cent deeper as compared with the corresponding ingot mold wall. The results of a detailed study of these conditions are to be reported later in another article.

Structural changes of the stool metal are accompanied by changes in shape or cross-section of the stool. All these influences tend to affect the usefulness of the stool to a varying extent. Consequently, much discussion is being devoted to settle the question of how long a stool should be used to the advantage of the plant or works as a whole. The decision is quite easy for the time of scrapping of ingot molds; the first "sticker" due to rough or locally eroded interior is an unfailing sign for discarding the mold.

It is somewhat different with stools. If a stool does not crack, it is frequently being put into production a manifold of the number of heats per corresponding mold. However, the question arises whether the increased continuous discard of uneven ingot bottoms is not more costly than a new stool with at least a fairly smooth top. Figures in several plants proved the fallacy of the apparent savings derived from many a "long-life" stool.

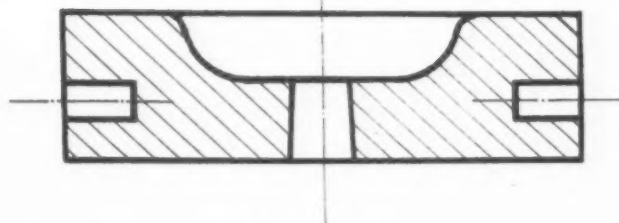


Fig. 2.—Ingot Mold Stool Used in Bottom Pouring of Large Ingots. Material: Cast Iron or Cast Steel

In many instances, reports are rendered to plant managers showing 100 to 500 per cent higher numbers of heats per stool than the corresponding molds. This fact may appear in favor of the steel producing departments, but does not balance with the normal output of the rolling mill, forge shop or the plant as a whole. Especially, in those establishments pro-

ducing higher priced alloy steels, this practice is very costly and should be investigated without prejudice to this or that department.

Design of Mold Stools Important

Since their inception, very little changes were made in the design of mold stools. Ordinarily, a stool is a heavy metal plate with suitable lugs, holes or cast-in hooks for convenient lifting. If the molds are to be placed on the teeming floor (stationary teeming) the stool is supported by rails or beams set into the floor; if the molds are filled while on buggies, the transverse cross-section of the stool is designed for a statically more favorable purpose. However, almost every plant has a certain type to which not only foundry, but also steel works executives have adhered frequently for many decades—perhaps even without reason.

Although the principles of the stool design seem to be extremely simple, there are several expectations which define to a considerable extent the future economy of the stool casting. Probably the most important feature is the proper consideration of the central overheating of the stool in each filling of the mold. The repeated heating and cooling of the center of the stool causes, quite often, transverse cracks from the outside portion of the stool plate toward the geometrical center of each ingot support. Similar causes of a decrease of the life of stools may be remedied by a redesign of the stool in accordance with these suggestions.

Lugs and other means for lifting should be provided for in places as far as possible away from the center of the molds or stools. The frequent shop routine, in certain quality works, of transporting the ingots with molds and stools into cooling pits, necessitates designs which make the safest and quickest attachment to the lifting crane possible. From the author's observations in many steel works in the United

(Continued on page 974)

LATELY stools for molds are being made of alloy gray iron or alloy cast steel. Remarkable savings are reported from this practice.

¶ Data prove the fallacy of the apparent savings derived from "long-life" stools.

¶ Most important feature in the design of stools is proper consideration of the central overheating of the stool in filling the mold.

¶ Ingot mold stools today are of nearly the same importance as regards economy and production as the mold itself.

Conveyor Washing Process Reclaims Oil From Turnings

SIX thousand gallons of cutting oil are daily recovered from 120 tons of steel turnings at the new Gambrinus plant of the Timken Roller Bearing Co. Special pan conveyors with screen bottoms carry the turnings through hot water sprays, after which they are briquetted for remelting.

AN unusual and efficient method of reclaiming oil from steel turnings has recently been put into operation at the new Gambrinus plant of the Timken Roller Bearing Co. at Canton, Ohio. The process has been patented, but nevertheless the process and results obtained will be of interest to plant operators who are confronted with this same problem.

A large quantity of turnings, averaging 120 tons per day, result from the automatic machining operations on the inner and outer races of the Timken bearings.

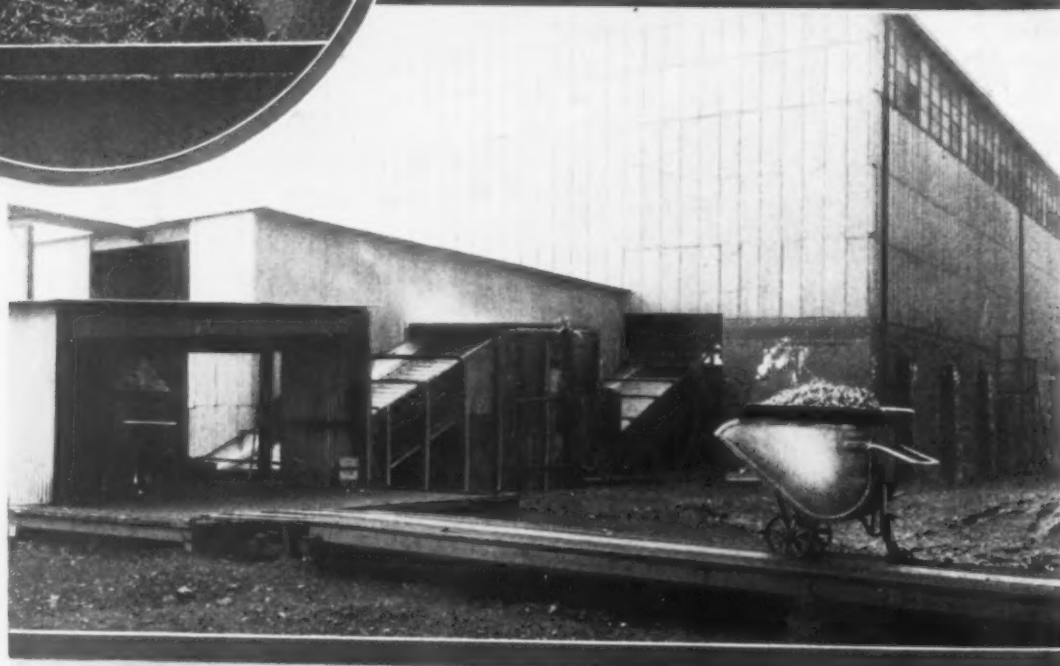
Three distinct problems are presented: (1) handling this large quantity of turnings; (2) reclaiming the maximum amount of oil; (3) efficiently handling the cleaned chips and preparing them for charging into the furnaces. These three problems have been worked out so that they become integrated in the process required to do this work.

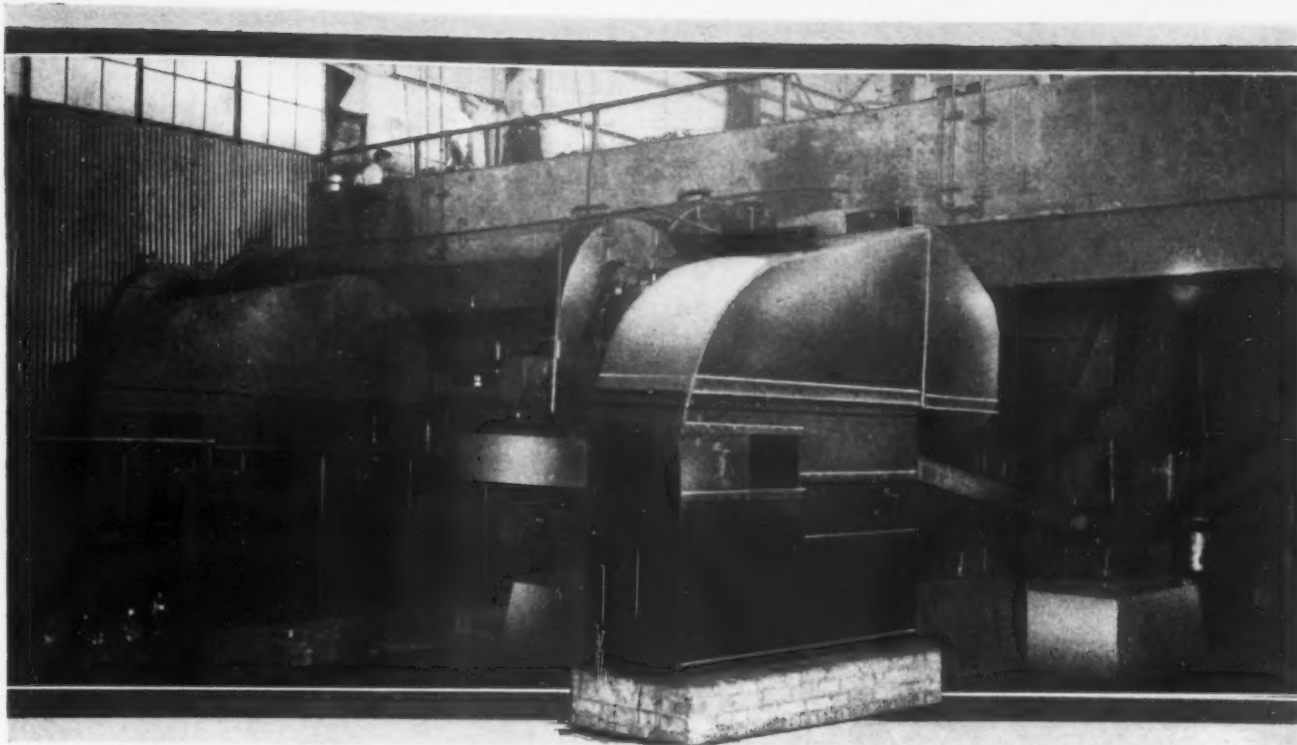
The turnings are collected from the automatic machines by two-wheeled buggies with swivel guiding

THREE-WHEELED buggies bring the turnings to the loading end of the conveyor system. After passing through the washer the cleaned turnings are discharged into the steel foundry building for briquetting and remelting.



CLOSE up view of a conveyor pan. This is about to enter the washer. The chips are distributed evenly over the pan, which has a wire screen bottom.





wheels and then are taken to the chip washer. The turnings are carried through this on a system of three Rex double-beaded pan-conveyors that were installed by the Chain Belt Co., Milwaukee.

To wash the large quantity of chips efficiently, the conveyor pans were made 6 ft. long with a middle section of galvanized wire screen cloth. The turnings are spread over this area as much as possible. After the turnings are sprayed they are discharged on to the second conveyor which runs in the opposite direction directly underneath the first one, so the turnings are turned over and sprayed again just before they are discharged upon the third conveyor.

This third stage allows the turnings to be turned over two times and sprayed three times so that the maximum amount of oil possible is reclaimed from them. By this process, there are about 50 gal. of oil per ton of turnings reclaimed in the summer time and about 60 gal. per ton reclaimed in the winter. This leaves only 2 to 3 gal. of oil in each ton of turnings after they have been washed.

For the washing process, only hot water at 210 deg. Fahr. is used. This is pumped to the washer under 85 lb. pressure, at the rate of 1000 gal. per min. The washing water is stored in a 30,000 - gal.

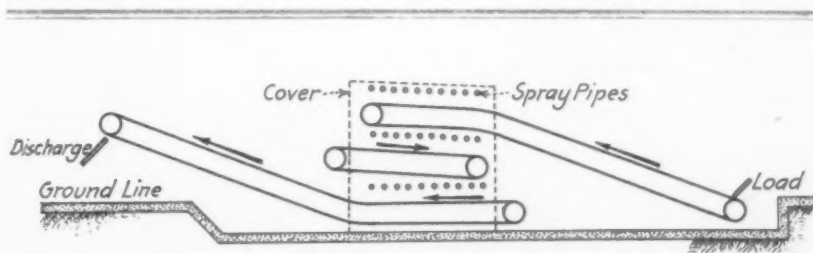
***A**FTER washing, the chips are fed to this pair of 300-ton Southwark briquetting machines. Here they are pressed into blocks which have about 60 per cent of the density of solid steel and which hold together when handling and feeding to the furnaces.*

sump, where it is heated to 210 deg. by live steam. The heat is controlled with a temperature regulator. By heating with live steam, the condensation makes up for the loss of water on the chips, so there is very little make up water added.

The oil, water, and fine turnings coming from the washer conveyors flow into a sump where the fine turnings sink to the bottom and are later taken out with a magnet suspended from a monorail track. The oil and water flow into a settling tank, where the oil rises to the top. It is skimmed off and passed through a centrifugal cleaner before it is used again in the automatic machines.

The sumps and settling tank are all below ground and the chip washer and conveyors are mostly above ground. Each one of the Rex conveyors consists of 6-ft. long double-beaded pans mounted on two strands of steel bushed roller chain with a malleable iron saddle in the center of each link to equalize the stress and wear on both side bars of each strand of chain. The rollers that carry the load are not mounted in the chain but run

on case hardened steel bushings on the outside of the chain strand for easy accessibility and maintenance. Unusually close tolerances had to be maintained in forming the over-



***A**"REX" chip washing conveyor forms the central unit of the reclaiming system. The turnings are subjected to three washings which extract 96 to 98 per cent of the cutting oil.*

lapping beads of the pans, so that the chips cannot get between them and cause any warping or undue wear.

It can be readily understood that the conveyor must be a substantial one in order to handle successfully the variety of turnings and this is illustrated in the photograph which shows the loading end of the first conveyor.

The turnings, after having passed through the final washing stage, are carried to a storage pit by the third conveyor in the system. A clamshell bucket on an overhead crane takes them from the pit to a machine where they are torn apart and ground up as much as possible, preparatory to pressing them into

briquettes so they can be conveniently handled. They are used as part of the charges for the open-hearth and electric furnaces. The briquettes weigh 25 lb. each and consist of 60 per cent solid material.

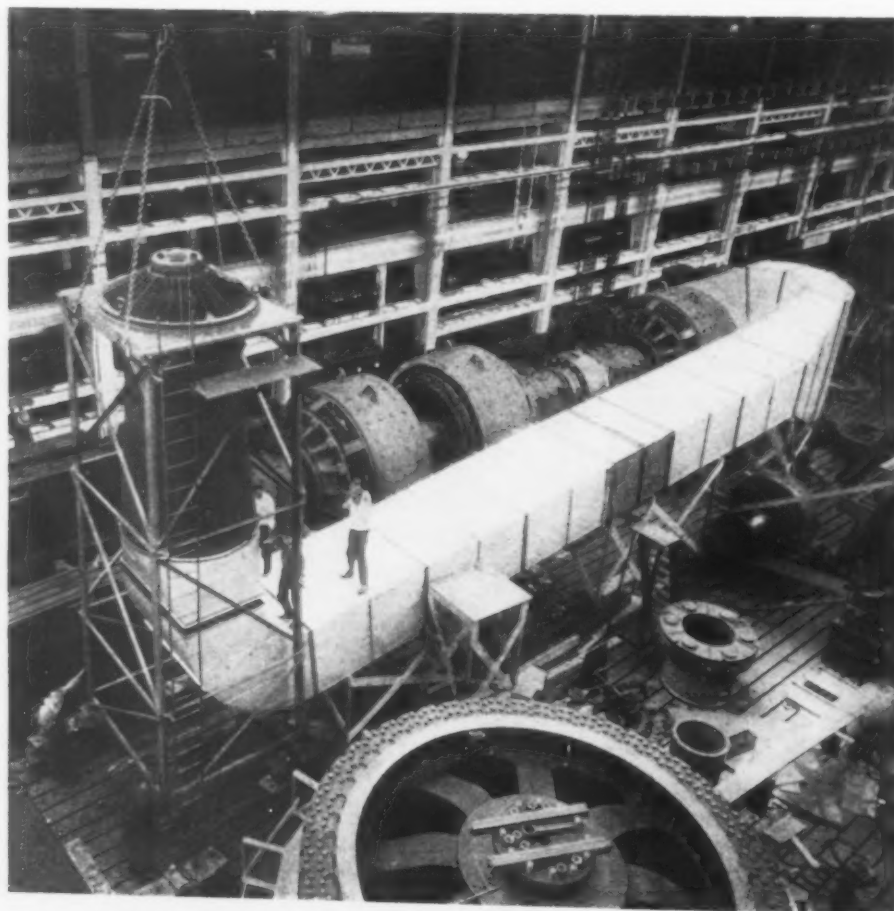
The apparatus used for making the briquettes consists of a battery of two 300-ton Southwark briquetting presses. In these presses, mechanical feed hoppers introduce the chips to a pre-compressing operation for compacting, after which they are fed to the hydraulic punch which forces them into the briquetting molds.

A high percentage of reclamation of oil and turnings has been accomplished by this process at a comparatively small investment.

10,000-Hp. Blooming Mill Drive

THESE 5000-hp. double-unit reversing motors for twin drive on a blooming mill will, when installed, deliver 10,000 hp.—more than has ever been applied to a single pair of rolls. They are shown in a shop test at the East Pittsburgh works of the Westinghouse Electric & Mfg. Co., with one of the motors ready to run at full load. To provide proper ventilation to care for the heat generated by these motors under load, a new type of fan of conical shape (shown in foreground) is used to force air through the duct running alongside. The fan is of vertical propeller

type, powered by a 75-hp. motor running at 1450 r.p.m., and forcing 70,000 cu. ft. of air a minute into the motor to keep it cool. Previously this type of fan has been used only on ships, where its function has been to keep the air pressure for forced draft in the entire boiler room. The final installation of the motors will follow the machine procedure, but no ducts or piping will be necessary. In the mill, one of these motors will be set behind and above the other, the whole installation measuring only 75 ft. long.



Machine Shop Accounting with the Aid of Mechanical Methods

By THOMAS B. FRANK

Treasurer, Cincinnati Planer Co., Cincinnati

IN these days of speed, efficiency and highly competitive bargaining we have come to accept machines as a material aid to practically all of our efforts. The field of accounting has been invaded by the machine and now we find most offices adding and calculating, billing and copying and even sorting and tabulating by mechanical methods. Most business men are familiar with the common types of mechanical office equipment. Hence this article will deal only with the mechanical sorting and tabulating features as they have been applied to accounting in the machine shop.

Modern business conditions make it imperative that accurate and up-to-date accounts be kept of all business transactions. The complexities of present-day industrial development compel the business executive to fortify his every action with facts and figures, lest he become involved in matters that may prove costly, or even ruinous, to his business.

Accounting has kept pace during the rapid development of the past 15 years in all of the arts and sciences. Industry has called more and more upon the accountant for information upon which to base executive decisions. Accountancy has met that challenge by developing many new ideas and new methods, both analytical and instructive as well as constructive, which give management more information than ever before.

However, in all this progress, there has been a tendency on the part of management to limit the expense of accounting departments, and at the same time to expect better results. This pressure for simplification and economy has been a boon to the accountancy profession, as it has been the means, or rather the incentive, by which labor-saving and cost-reducing methods and machines have been developed. These newer

MACHINERY has multiplied the power of the human hand many fold. Each wage earner in industry can turn out a product greatly in excess of any output which was possible to his grandfather. Accounting is a recent example where the extension of machinery has greatly multiplied the productivity of man's fingers. The author tells how his company makes use of mechanical tabulating equipment for sorting and analyzing pertinent facts regarding the business. One great utility of this equipment lies in its ability to aggregate, by groups, information in any desired order. Its flexibility appears to be almost unlimited.

methods and machines have taken the guesswork and human inefficiencies and inaccuracies out of the accounting departments of modern business establishments.

Four Kinds of Accounting

ACCOUNTING work falls into one of four classes; historical, analytical, critical and constructive. Historical accounting is mere bookkeeping, the recording of facts and figures of transactions that have already transpired.

Analytical accounting takes the recorded facts and figures of the past, combines them with the facts and figures of the present, analyzes them and points out the whys and wherefores. It interprets the figures.

Critical accounting is a combination of the analytical and interpretive functions, in that the results of the analytical and interpretive work are broken down into the component parts, and the causes therefor criticized and discussed and action taken for the correction or change of wrong methods, and of the causes therefor, and for the improvement of the methods of performance.

Constructive accounting combines all of the foregoing phases into a program for the building up or rehabilitating of accounting systems, to make for greater accuracy, greater efficiency or greater usefulness.

The use of machines in accounting work probably falls primarily in the constructive class, although the machines are used to advantage in compiling data for all classes. By their means greater efficiency, accuracy and usefulness of all accounting work is obtained. All of this is secured at less cost than by any other method. The results of the historical, analytical, critical and constructive accounting activities can be tabulated and classified and then made ready

for use by management in remarkably short time.

What Tabulating Equipment Is and What It Does

A BRIEF description of tabulating equipment will be given, to permit a definite understanding of the methods herein-after referred to. It consists principally of three machines, a key-punch, a sorting machine and a tabulating machine.

The key-punch is provided with a keyboard of the figures from 1 to 9 and the zero, as well as a number of control or operating keys. By means of this punch, perforations are made in card forms to indicate, by their position on the card, the figures represented thereon by written information. An experienced operator can punch about 2200 cards a day.

By a series of electrical contacts made through the perforated or punched holes, the sorting machine selects the different figures punched on the cards as they pass through a slot on the machine, and drops them into a separate pocket for each figure. This machine sorts at the rate of 400 cards a minute.

The tabulating machine adds or counts at the rate of 90 to 100 cards a minute, and adds in one operation all columns punched on the cards, showing the totals on different dials. The cards are fed through the machine automatically. All the operator does is to

Fig. 1—Clock Card, Replacing Old Payroll Book

put the cards into the container on the machine.

The time-saving features of this mechanical equipment are obvious, as is also the scope of the work that may be done with the machines.

By means of this mechanical tabulation many of the original shop records, such as time cards, clock in-and-out cards, requisitions, etc., may be made to do double and triple duty. Many copying operations may be eliminated, as the original card record becomes the final, and therefore the only, record of detail.

Cards Replace Payroll Book

The old payroll book may be discontinued, and the original clock in-and-out card made the authority for payment of employees. At the end of the pay period

the clock cards are sent to the office, where they are figured and all information is then punched into the card as shown on Fig. 1. The cards are then sorted according to employee number, and the totals of all columns obtained by a run through the tabulator. The totals so obtained constitute the total payroll figures.

After recording on the card the method of payment (check number, etc.), the cards may be filed according to employee number for future reference. The cards are then in order for tabulation of yearly earnings per employee, etc., as required for income tax purposes and other reports. Mechanical tabulation makes this task an easy one to perform and it consumes very little time. The savings compared with old hand methods are obvious.

In addition to the clock cards, most shops use job-cards to record the time consumed on each particular job going through the shop. The different classes of work in the shop, such as Direct Labor, Indirect Labor or Spe-

Fig. 2—Job Time Card, Carrying Also the Burden, Making Computation of Completed Cost Easy (Above)

Fig. 3—Material-Requisition Card Helps in Control of Inventory

Fig. 5—Maintenance-Order Card, Used in Same Manner as Those for Production

cials, may be designated by cards of different colors. The colors are a distinct aid to the clerks who figure the cards, as they do not have to stop to read the information on the card to know what method to use in calculating the time, earnings and burden applied to each card.

A sample of a job-card is shown on Fig. 2. One of these cards is made out for each job worked on by each worker during the pay period, usually one week. The total time and earnings on these cards should balance with the time and earnings shown on the clock in-and-out cards which were used for the payroll. Other pertinent information is also shown and punched into the card, such as clock number, department, group number (group or unit of product, where the individual part being worked on is to be used), piece number, account or order number (to which the time is to be charged), equipment number (number of shop machine on which the work is done), hours, earnings and burden.

Note that the burden is computed on the job time card. This is done to facilitate final tabulation without a second handling of the cards. The burden is based on the machine-hour for machining operations and on the man-hour for assembly or vise work. Therefore it is a simple matter to compute the burden upon the hours shown on the job-cards. These cards, when filed by order or account numbers, are then ready for the tabulation of the completed cost.

Requisitions for materials used are made out on cards, also, Fig. 3, and are filled out direct from information contained on bills-of-material or material lists. The

essential information is punched into the card as shown. All of the cards representing materials issued to the production departments from stockrooms, during a given period, are then sorted by classes of materials and are tabulated. The resulting figures constitute the transfer from inventory accounts to the work-in-process account. The cards are then filed by order number, and are ready for the compilation of the completed cost.

Cost summary sheets are provided to record the tabulation of both labor and materials and the g. 4. The cards for a given order, and material requisitions, are re-s and re-sorted, if necessary, so as egement called for on the cost sum-re put into the tabulator and the he total figures from the machine the machine stops automatically at rring each to the summary sheet.

A grand total of all cards should equal the total cost of the order. This may be checked and double checked in any manner desired, on the machine, by simply running totals of the various classifications needed. By this mechanical method the work may be done in from one-third to one-fifth of the time required by older hand methods, and it is done with the utmost accuracy.

In most machine shops there are several classes of work being performed, which usually are designated as Lot Orders, Stock, Jobs, Repairs, Tool Orders, Maintenance Orders, etc., all of which may require separate and individual forms for cost compilations. However, the principle is the same; they may all be

(Continued on page 975)

[illegible]

Fig. 4—Cost Summary, Compiled from the Cards in Figs. 2 and 3,
Used as Basis for Charging or Billing

[illegible]

Should Steel Machinery Parts Be Cold Rolled?

By G. S. von HEYDEKAMPF, Dr. Ing.*

Research Engineer, Southwark Foundry & Machine Co., Philadelphia

OBJECTIONS may be raised to the conclusions suggested by the author in his article in THE IRON AGE of Sept. 18 that an increase in fatigue strength would be of doubtful value if gained by sacrificing an essential part of the ductility of the material, that cold working of any kind is known to reduce the elongation at fracture of tensile test pieces, and that such elongation is generally considered to be a measure of ductility.

In these tests, however, the cold-worked area in a cross-section is so small that no appreciable loss of elongation is to be expected, and the ductility, as indicated by the elongation at fracture of a tensile specimen, will not be greatly affected, especially as the specimens were of hard steel.

But the ductility, measured by the elongation at fracture under a static load, and which may be called "static" ductility, does not merit any too great consideration, at least so far as fatigue failure is concerned. While there is not space in this article to take up this point in full detail, the following brief explanation may serve to justify the above rather unusual statement.

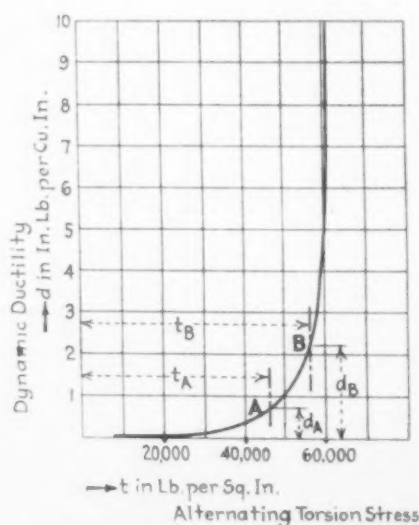
Static ductility measures the ability of the material to withstand without fracture great plastic deformation at stresses near to the ultimate tensile strength. In fatigue tests and in practical service the stresses remain very much lower than this ultimate strength value. The static ductility, then, does not necessarily indicate the ability to deform plastically

without fracture under repeated cycles of stress in the service, or the fatigue-test range. It seems to be logical to use such plastic deformation as occurs within the range of fatigue tests or of service stresses as a measure of such ability.

The name "dynamic ductility" is suggested for this property. As shown by many tests nearly all materials actually exhibit slight plastic deformation even when stressed within the range of fatigue strength (say to 40 or 50 per cent of the ultimate tensile strength for metals). Furthermore, this dynamic ductility for a given metal is not always proportional to the static ductility.†

According to O. Foepl, who apparently was the first to emphasize the importance of this dynamic ductility, the best method of measuring its value consists in measuring the mechanical work absorbed per unit volume of the material when subjected to a complete stress cycle of completely reversed stress.

This work, absorbed due to plastic deformation, damps free vibrations of the material, even in the absence of any external damping force. For this reason the dynamic ductility has also been called "damping capacity." Moreover, the dynamic ductility as determined by Foepl is equal to the "mechanical hysteresis" for any cycle of stress. This absorbed energy is transformed into heat and causes a rise of temperature in a running fatigue specimen. Such a rise of temperature does not necessarily indicate the start of a fatigue crack, but can frequently be detected for stresses below the fatigue limit. The whole subject of measurement of dynamic ductility will be discussed more fully in a later article in THE IRON AGE, especially



A STEEL of 212,000 lb. tensile strength showed the dynamic ductility factor of B when the specimen was cold rolled and the factor A when not cold rolled

*The author was identified with the Babcock & Wilcox Co. when his article, of which the present one is a supplement, appeared in the issue of Sept. 18. Meanwhile he made his new connection, as indicated above.

†A very brief discussion of ductility accompanying very slight plastic action is given in Bulletin 164, Engineering Experiment Station, University of Illinois.

in connection with the problem of the elastic limit.

Results of a test for dynamic ductility may best be shown by a graph plotted, with values of maximum stress during a cycle as abscissas and values of plastic work absorbed per cycle per unit volume as ordinates. Such a graph for steel "X" of the Deutsche Edelstahlwerke is here reproduced. This steel has the same composition as steel "Y", referred to in the earlier article, but has another heat treatment, so that the tensile strength was 212,000 lb. per sq. in. The cycle of stress used was a cycle of completely reversed torsional stress.

It may be seen that the dynamic ductility of this steel is small for low stresses, but begins to increase rapidly for stresses in the vicinity of 50,000 lb. per sq. in. From fatigue tests it was determined that the endurance limit for specimens polished but not cold rolled, t_A , was 47,000 lb. per sq. in., while the endurance limit for specimens polished and then cold rolled, t_B , was 55,000 lb. per sq. in. The dynamic ductility, d_B for the cold-rolled specimens is seen to be much greater than d_A , the dynamic ductility for the non-cold rolled specimens. The non-compressed specimens break, due to surface imperfection, before the increase of dynamic ductility from d_A to d_B can be utilized.

So by cold rolling the surface, not only is the fatigue strength increased, but the endurance limit is shifted into a field of higher dynamic ductility. This effect may well be at least as important as the direct increase of endurance limit. For further discussion of this point the author can supply a list of articles that have appeared in Germany on the subject.

Results herein reported show that, for two kinds of steel tested, the endurance limit was increased approximately 15 per cent by means of cold rolling the surface of the specimens, and at the same time the dynamic

ductility (available work absorbed by plastic action) was increased for the range of stress corresponding to the endurance limit. Other tests have shown similar results for Lautal (light metal), copper and bronze.

Conclusions

This method seems to be of peculiar promise in connection with highly stressed machine parts, which sometimes break after a relatively short period of service. Even if the stress is above the endurance limit, the tests indicate that the length of service before fracture may be very considerably lengthened by cold rolling the surface. This is illustrated by specimen No. 73 in the table, on page 777 (THE IRON AGE, Sept. 18).

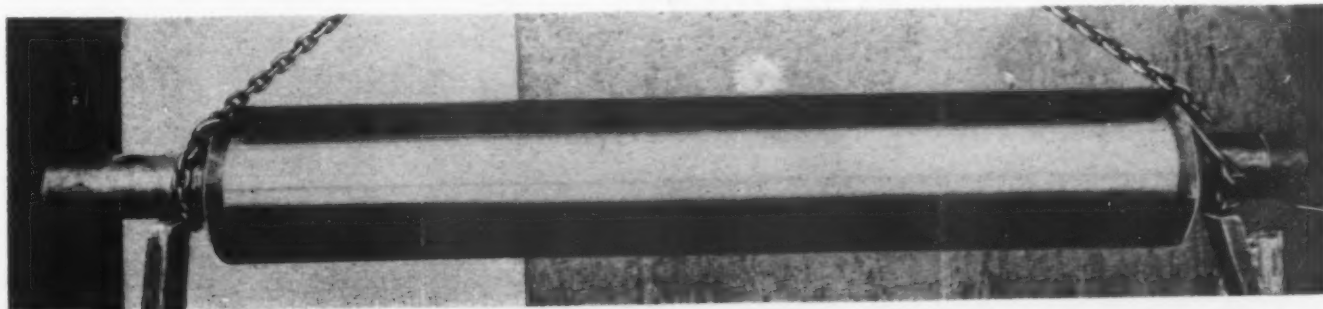
This, even with a 10 per cent higher stress, lasted from 35 to 150 times as long as did the corresponding specimens which had not been cold rolled. A similar and probably still greater increase of service time is to be expected when stressing the cold-worked parts not higher than the polished ones. This increase in lifetime would be utilized by replacing normally finished parts, which now fail after short service, by cold rolled pieces.

Practical problems in the utilization of this means of increasing fatigue strength and effective ductility, such as the question whether to replace polishing by cold rolling, or merely add the new cold-rolling operation to the usual grinding finish, are under investigation at the present time.

Cast Iron Roll for Rolling Glass

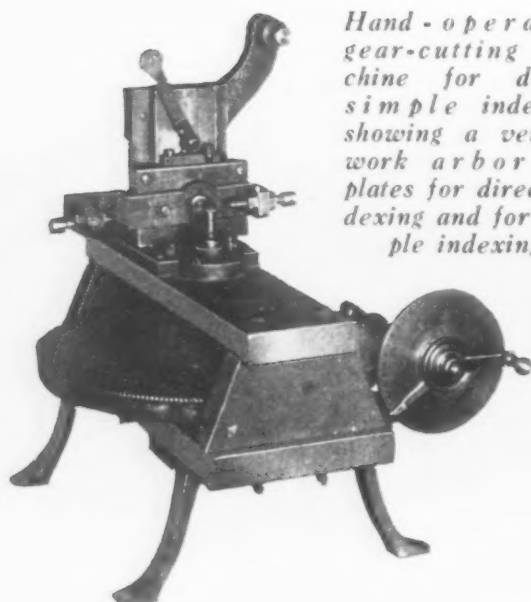
THE roller here shown is 6 ft. long and 1 ft. in diameter, made of cast iron for rolling glass. It is a product of the Busch-Sulzer Brothers-Diesel Engine Co., St. Louis. To meet the shock-contact of molten

glass and impart smoothness of surface to the glass, ruggedness, density and lack of porosity were required as well as heat treatment to prevent deformation and to remove casting strains.

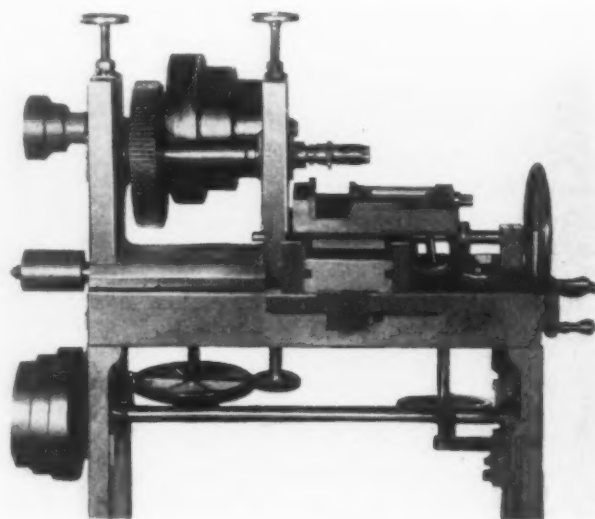


SOME OF THE PREDECESSORS OF OUR AMERICAN MACHINE TOOLS AND ENGINES

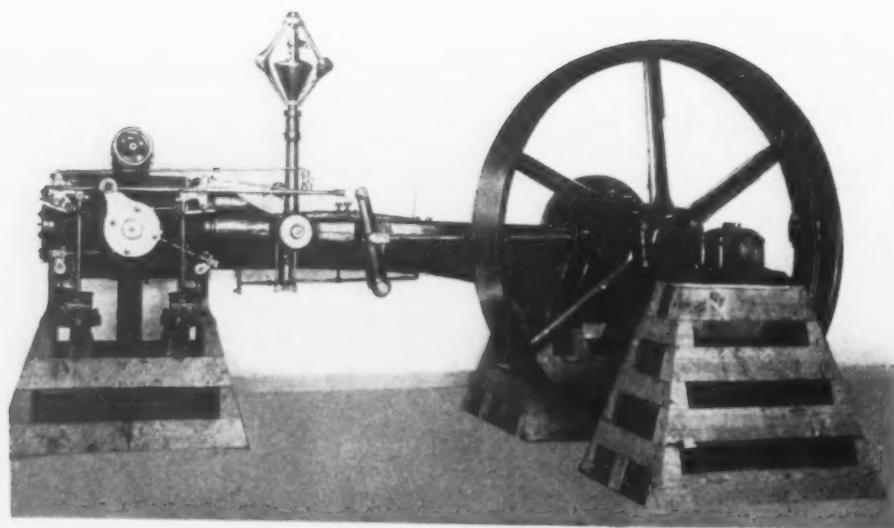
AMONG the permanent or semi-permanent exhibits in the Museums of the Peaceful Arts, at 220 East Forty-Second Street, New York, are those illustrated. These are merely samples of a large number of old pieces of equipment of various descriptions which the museum has on display. The early history of the machine tool industry is tied up in many of these old units. They mark in some instances the real beginnings of our modern tooling and precision machining.



Hand - operated gear-cutting machine for direct, simple indexing, showing a vertical work arbor and plates for direct indexing and for simple indexing.

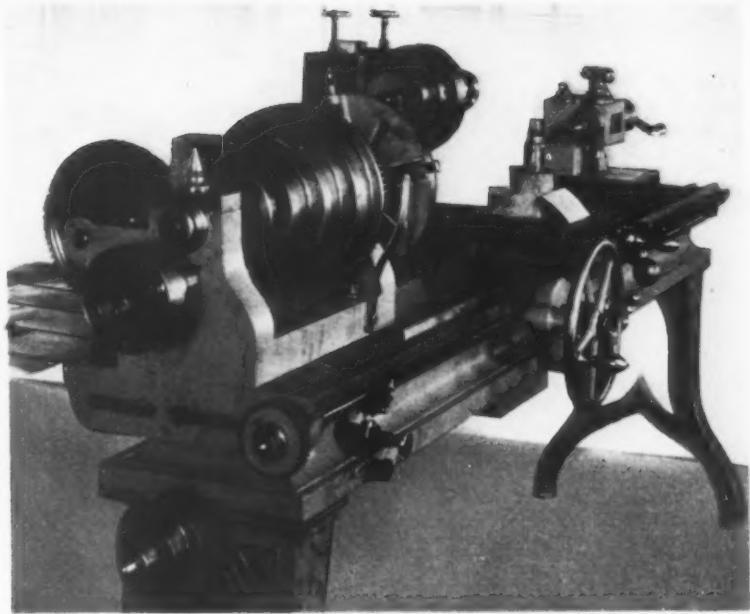


Plain milling machine built by Robbins & Lawrence Co. at Windsor, Vt., about 1851.

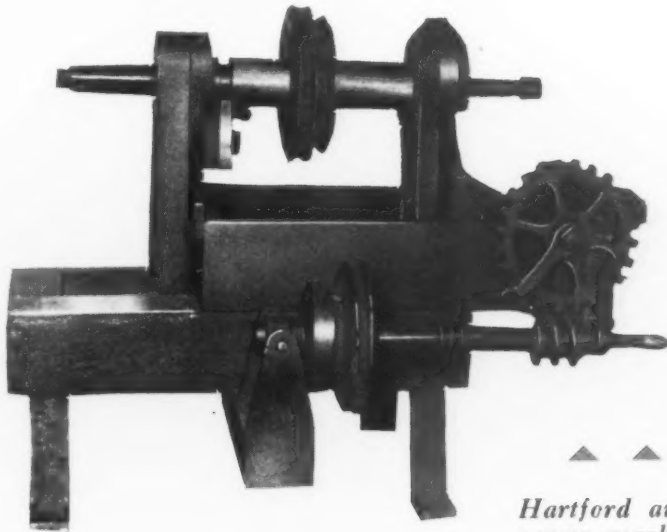


Corliss engine built about 1884.

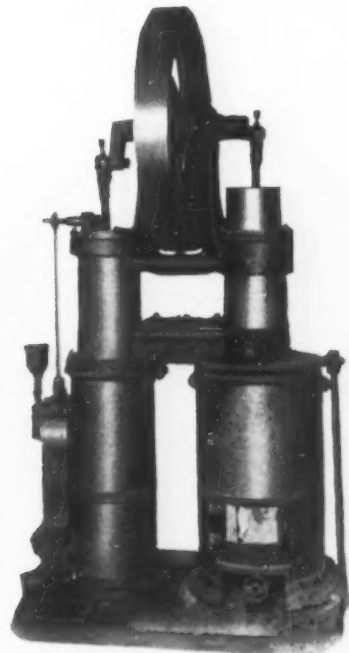
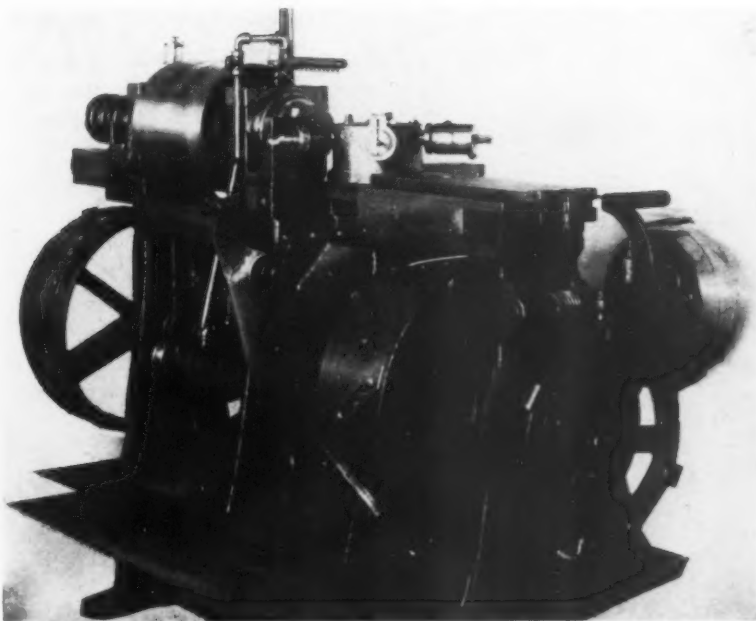
Engine lathe built by Robbins & Lawrence Co. at Windsor, Vt., 1852. This was designed by Frederick W. Howe and Richard S. Lawrence.



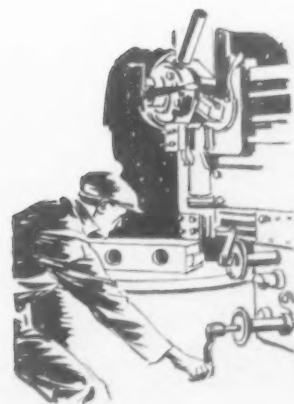
Original milling machine built in 1818 by Eli Whitney, famed as the inventor of the cotton gin.



Hartford automatic screw machine, being an early Spencer automatic lathe or screw machine.



Ericsson hot air engine for pumping.



Offers Some New Hardness Tables

By T. N. HOLDEN, Jr.

Metallurgist,
E. W. Bliss Co., Brooklyn

DUE to the interest shown in the conversion tables for hardness tests, published in *THE IRON AGE* of July 10, it has seemed advisable to offer two more which are reproduced herewith. One of the tables deals with the Brinell hardness using a 5-mm. ball with 750 and 250-kg. load. The other table shows Brinell hardness numbers using a 10-mm. ball with 3000, 1000 and 500-kg. load.

The chart showing Brinell numbers, arrived at from the use of the 5-mm. ball, is considered useful in determining the hardness of sheet metal which would be too thin to test with a 10-mm. ball. The other chart, in which a 10-mm. ball is used, is not new except that it shows the Brinell number with a 1000-kg. load. This 1000-kg. load is applicable for testing bronzes and

aluminum alloys for which the 3000-kg. load is too much and the 500-kg. load too little.

Reasons for publishing these tables are that they are not commonly printed and it is my opinion that they would be used if they were made accessible for testing metals.

A recommended standard practice for the preparation of surfaces for Brinelling is as follows:

For a 10-mm. ball and a hardness number less than 248, fine grinding or filing is satisfactory. For hardness numbers higher than 248, fine grinding with an emery cloth polish is recommended. For the 5-mm. ball use emery cloth finish.

So far as other details are concerned, the charts are self-explanatory.

BRINELL HARDNESS NUMBERS

Diameter of Ball = 5 mm.

Diam. mm.	Load KGMS.		Diam. mm.	Load KGMS.		Diam. mm.	Load KGMS.	
	750	250		750	250		750	250
1.00	945	315	1.70	321	107	2.40	156	51.9
1.025	899	300	1.725	311	104	2.425	153	50.7
1.05	856	285	1.75	302	101	2.45	149	49.6
1.075	817	273	1.775	294	98	2.475	146	48.5
1.10	780	260	1.80	285	95.0	2.50	143	47.5
1.125	745	249	1.825	277	92.4	2.525	140	46.5
1.15	712	237	1.85	269	89.7	2.55	137	45.5
1.175	682	227	1.875	262	87.3	2.575	134	44.6
1.20	653	218	1.90	255	84.9	2.60	131	43.7
1.225	626	209	1.925	248	82.7	2.625	129	42.7
1.25	601	200	1.95	241	80.4	2.65	126	41.9
1.275	578	193	1.975	235	78.4	2.675	124	41.0
1.30	555	185	2.0	229	76.3	2.70	121	40.2
1.325	534	178	2.025	223	74.3	2.725	119	39.4
1.35	514	171	2.05	217	72.4	2.75	116	38.6
1.375	496	165	2.075	212	70.6	2.775	114	37.8
1.40	477	159	2.10	207	68.8	2.80	111	37.1
1.425	461	154	2.125	201	67.2	2.825	109	36.4
1.45	444	148	2.15	197	65.5	2.85	107	35.7
1.475	429	143	2.175	192	63.9	2.875	105	35.0
1.50	415	138	2.20	187	62.4	2.90	103	34.3
1.525	401	134	2.225	183	60.9	2.925	101	33.7
1.55	388	129	2.25	179	59.5	2.95	99.2	33.1
1.575	375	125	2.275	174	58.1	2.975	97.3	32.4
1.60	363	121	2.30	170	56.8	3.0	95.5	31.8
1.625	352	118	2.325	167	55.5			
1.65	341	114	2.35	163	54.3			
1.675	331	111	2.375	159	53.0			

BRINELL HARDNESS NUMBERS

Diameter of Ball = 10 mm.

Diam. mm.	Load KGMS.			Diam. mm.	Load KGMS.			Diam. mm.	Load KGMS.		
	3000	1000	500		3000	1000	500		3000	1000	500
2.0	945	315	158	3.35	331	110	55.1	4.70	163	54.3	27.1
2.05	899	300	150	3.40	321	107	53.4	4.75	159	53.0	26.5
2.10	856	285	143	3.45	311	104	51.8	4.80	156	51.9	25.9
2.15	817	272	136	3.50	302	101	50.3	4.85	152	50.7	25.4
2.20	780	260	130	3.55	293	97.7	48.9	4.90	149	49.6	24.8
				3.60	285	95.0	47.5	4.95	146	48.6	24.3
2.25	745	248	124	3.65	277	92.3	46.1	5.00	143	47.5	23.8
2.30	712	237	119	3.70	269	89.7	44.9	5.05	140	46.5	23.3
2.35	682	227	114	3.75	262	87.2	43.6	5.10	137	45.5	22.8
2.40	653	218	109	3.80	255	84.9	42.4	5.15	134	44.6	22.3
2.45	627	209	104	3.85	248	82.6	41.3	5.20	131	43.7	21.8
				3.90	241	80.4	40.2	5.25	128	42.8	21.4
2.50	601	200	100	3.95	235	78.3	39.1	5.30	126	41.9	20.9
2.55	578	193	96.3	4.0	229	76.3	38.1	5.35	123	41.0	20.5
2.60	555	185	92.6	4.05	223	74.3	37.1	5.40	121	40.2	20.1
2.65	534	178	89.0	4.10	217	72.4	36.2	5.45	118	39.4	19.7
2.70	514	171	85.7	4.15	212	70.6	35.3	5.50	116	38.6	19.3
				4.20	207	68.8	34.4	5.55	114	37.9	18.9
2.75	495	165	82.6	4.25	201	67.1	33.6	5.60	111	37.1	18.6
2.80	477	159	79.6	4.30	197	65.5	32.8	5.65	109	36.4	18.2
2.85	461	154	76.8	4.35	192	63.9	32.0	5.70	107	35.7	17.8
2.90	444	148	74.1	4.40	187	62.4	31.2	5.75	105	35.0	17.5
2.95	429	143	71.5	4.45	183	60.9	30.5	5.80	103	34.3	17.2
				4.50	179	59.5	29.8	5.85	101	33.7	16.8
3.00	415	138	69.1	4.55	174	58.1	29.1	5.90	99.2	33.1	16.5
3.05	401	134	66.8	4.60	170	56.8	28.4	5.95	97.3	32.4	16.2
3.10	388	129	64.6	4.65	167	55.5	27.8	6.00	95.5	31.8	15.9
3.15	375	125	62.5								
3.20	363	121	60.5								
3.25	352	117	58.6								
3.30	341	114	56.8								

National Metal Exposition in Chicago

Stressed Alloys and Welding

IN a setting unique the National Metal Exposition last week in Chicago differed from any other ever held by the American Society for Steel Treating. The spacious Hotel Stevens never housed so large a display. It gave up space usually used for routine purposes.

The 200 or more exhibitors occupied about 35,000 sq. ft. but were located in several parts of the building. Besides the main exhibit hall in the basement, which was inadequate, the large main ballroom was filled and the foyer outside. From there it spread continuously to the lounge which leads to the main dining room, which was also fully occupied. There were other nooks and corners, particularly in the basement, where exhibits were located.

While there were some disadvantages because of the dispersed character of the display as a whole—not in one large place as in the Cleveland auditorium last year—there were many advantages. Expressions of disapproval because of the new conditions were generally outweighed by statements that contacts were more easily made under the one roof where members and visitors lived, and that one could go from a technical paper's presentation to the exhibits and back again at any time.

While the exposition was less than half as large in space as last year and in other more recent years, in beauty of surroundings and in conveniences it has been unsurpassed. Particularly striking was the ballroom, where most of the steel companies were located.

Distinctly an Alloy Exposition

"An Alloy Exposition" was an expression frequently heard as the impression of many visitors. Undoubtedly this was justified. At almost every turn, alloy steels or special alloys, ferrous and non-ferrous, commanded one's attention. If there is any doubt that the "alloy age" is upon us, this year's exposition dispelled it. To call attention, here in detail, to all of the alloys, old and new, is not possible. The advance in these fields was convincingly demonstrated.

Impressive Showing by Steel Companies

Progress made recently in the development of corrosion-resisting steel and products fabricated therefrom featured the exhibits of steel companies at the exposition. At least a

dozen companies displayed chrome-nickel alloy steels in various forms ranging from minute samples of wire to a completed automobile with visible parts made principally of such materials. Exterior parts of this car were made of 16 to 18 per cent chromium steel with no nickel content and included the hood, radiator, fenders, side apron, head and cowl lamps, windshield frame, instrument panel, door handles, gasoline tank cover, wheel hubs and spokes and other smaller fixtures.

The wide range of uses to which corrosion-resisting steels are now being put attracted as much attention among casual visitors to the exposition as among those identified with the steel and allied industries. A completed soda fountain entirely equipped with high chrome-nickel steel fixtures was prominently displayed by one company, while another showed a section of steel tubing so small that a microscope was necessary to observe its construction. With nothing essentially new in metallurgical content manufacturers centered their attention upon the wide diversity of uses for non-corrosive materials, em-

phasizing the great potentialities which this market offers.

High-speed and tool steels in various applications were also shown by a number of makers. Progress during the year seems to have been along the lines of further refinement in use rather than in new materials. Cutlery steel in the full range of application was shown by United States as well as foreign makers while die steels were prominently exhibited.

In the castings field, heat-resisting alloys occupied a prominent place. Here also chrome-nickel products were numerous, with certain parts for furnaces and heat-treating equipment capable of resisting temperatures up to 2000 deg. Fahr. Other alloy parts shown were designed for carburizing boxes, lead, salt and cyanide pots, dipping baskets, trays, rollers, etc. Acid-resisting alloys were also exhibited by several makers.

Welding Exhibits Comprehensive

The welding section included the products of more than 25 companies. Welding, cutting and brazing equipment and accessories of all types were demonstrated, much of it in ac-

AROUSIA AROUTNOVA, a Russian metallurgist, was a visitor at the exposition. A photographer posed her at a hardness testing machine. She has been in this country about a year at the Ford company laboratory in Detroit and will return to Russia in charge of heat treatment at the new Ford plant, Autostroy, in Nijni Novgorod, Russia.



tual operation. In addition, there were comprehensive displays of welded products, small and large; also photographic exhibits and engineering data covering all types of welding applications.

Welding rods and wire, shown by several companies, included tobin bronze, aluminum and other non-ferrous metals and rods for welding austenitic chromium-nickel alloys. Among the latter was a new flux-coated rod, said to be suitable for overhead and vertical welding and for welding the 18 and 8 alloys to mild steel. Hard facing alloys in welding rod form were exhibited, and the specimens of faced ploughshares and other parts reflected increased use of these materials.

Welding and cutting torches and regulators of many designs were to be seen. One company featured a new precision duplex, simultaneous welding and cutting, pressure regulator. Oxy-acetylene motor-driven shape cutting machines were demonstrated, and a portable tensile machine for testing welds in the field was shown.

Arc welding equipment included both carbon and metallic arc, portable and stationary, motor, gas-engine and belted drive, single and two-operator units. A new portable two-bearing welder equipped with remote current control, a convenience on structural and similar work, was featured by one company. A control device on the welding cable, a few feet from the electrode holder, actuates an indicator on the welder; the indicator is large and may be seen easily by the operator from his working position.

An Electronic Tornado machine for carbon arc welding was demonstrated in the welding of 36-in. diameter, 1/2-in. wall pipe. The weld obtainable is ductile, with an elongation of 20 to 25 per cent in 2 in. and tensile strength ranging from 60,000 to 80,000 lb. per sq. in. Automatic seam welders were also in operation at the booths of two other companies.

Atomic-hydrogen arc welders, both hand and automatic, the latter a recent development, were shown. The automatic unit, longitudinal for seam welding, consists of a work-clamping device, an automatic travel carriage, a welding head and control devices. An auxiliary device feeds the filler rod into the arc. Equipment to dissociate anhydrous ammonia into its component parts, supplying hydrogen economically for atomic-hydrogen welding, was also introduced by this company.

One of the newest developments in the arc welding field, demonstrated by the same company, is a portable self-propelled automatic unit for welding steel floors of buildings, ship decks and for use on the tops and bottoms of oil storage tanks and for similar work. The electrode is fed automatically and the machine has a wide range of speed.

Electric equipment for brazing or hard soldering brass, copper, bronze or steel, another item of this company's exhibit, features regulated heat application to the jaws of the clamp-

ing tongs. Heat is generated by passing current through a pair of carbon blocks between which the parts to be joined are clamped. An electric brazing torch of light weight was introduced by another manufacturer. This device operates on the principle of the carbon arc and takes current from a light socket; it is made up of a handle, carbons, lead cable and reactor coil. A tightening grip on the torch handle brings the carbons together and closes the circuit. The carbons are then permitted to separate slightly, and the arc is formed.

Improved Resistance Welders Shown

New and markedly improved electric resistance welding machines were introduced at this exposition. One company demonstrated a combination hand and foot-operated spot welder equipped with a four-speed motor. The switch and pressure are cam controlled. Electrodes and transformer are water cooled, and a spring pressure gage is provided to facilitate re-setting. The machine has a 12-in. hardened and ground steel slide with take-up gibs. The same company exhibited a butt welder having combination motor and hand upset. The push-up is cam operated and the dies can be opened to permit annealing. A safety feature is the ratchet release, which prevents damage to the upsetting mechanism.

A seam welder and a press welder incorporating a number of significant improvements were demonstrated by another company. These machines were described at length in *THE IRON AGE* of Sept. 18 and Sept. 25. A new butt welder, which among other features has an aluminum platen, new air clamps and fully automatic power-driven push-up, was a center of attraction at the same booth.

Hand and head type welding shields were among the large variety of accessories displayed; an automatic eye protector for use in connection with such shields was introduced. In this, the welding current passes through an induction coil, setting up a second current that actuates magnets and causes the lenses of the eye protector to flip into the welder's line of vision. The instant the welding arc is broken the magnets release their hold and the lenses flip out of the line of vision. A plugging arrangement permits disconnecting the helmet from the line coil instantly. The welder has free use of both hands and is saved from the necessity of repeatedly removing and replacing his helmet or of tipping it back on his head to inspect the work.

Samples of Welded Products

Specimens and photographs of welded products reflected increased application of the welding processes. One company showed pressure vessels made of class B 3/4-in. thick welding steel plate with flanged and dished heads having a 20-in. spherical radius, with 3-in. fillet radius. The plates tested to 58,400 lb. tensile, 36,400 lb.

yield point and showed 30 per cent elongation. The vessel was 20 in. outside diameter and 18 in. long in the straight shell.

During the test the original spherically dished heads changed to ellipsoid form with an axis ratio of 1 to 2. The shell stretched 6 in. at mid-section. Although the theoretical bursting pressure of the shell was 4733 lb. per sq. in., the actual pressure applied exceeded this figure without sign of failure either in the weld or the plate. The welding was by the "metallurgically controlled, tempered arc" process used by the company in fabricating all types of welded tanks and other products.

Another company showed a large welded tin mill cover that has been through 122 black heats and is good for many more.

Photographs of a number of large welded products of 18-8 chromium-nickel alloys showed effective application of welding in this comparatively new field. A number of large and heavy sections that had been thermit welded were also exhibited.

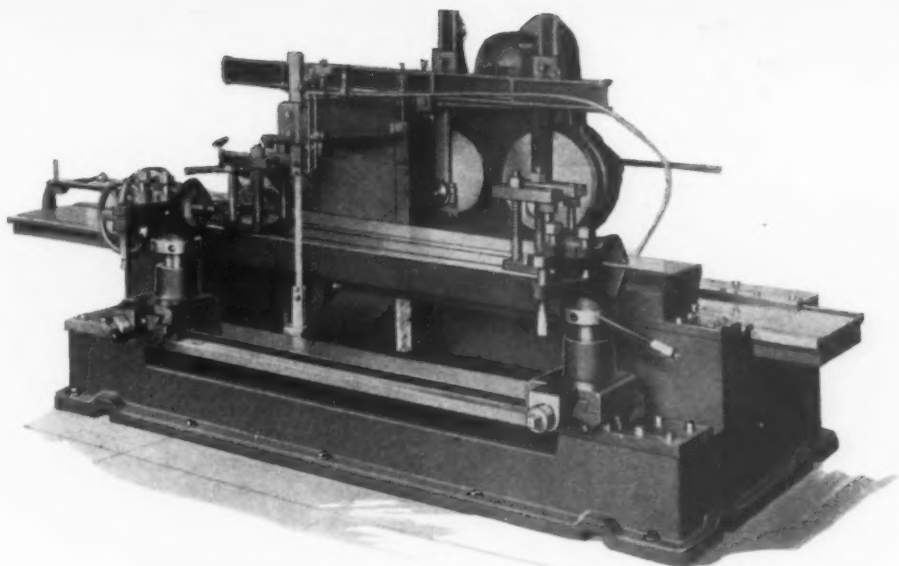
New Hard Alloy Cutting Tool

Tool, die and high-speed steels, displayed by 17 or more companies, formed an attractive section of the exposition. Tungsten-carbide tools included Carboloy, Firthite and Strauss metal, all of the cemented class; also Haystellite, the cast tungsten carbide.

Lathe and other cutting tools tipped with a new hard alloy named Vascoloy were introduced by a maker of high-speed, carbon and alloy tool steels. Of interest in connection with the claims for this material is that it is unusually adapted for turning steels. Other characteristics of this alloy, a fused product, will be described in later issues.

In addition to these extensive displays of cutting tool materials, lathe tools, drills, reamers, milling cutters and other small tools were exhibited by several companies. One company demonstrated a new drill in the drilling of forged manganese steel containing 11 to 13 per cent manganese, 1.20 per cent carbon. A 13/16-in. drill was used, drilling holes 1 in. deep, 25 holes per grind. The same company demonstrated its interchangeable punch and retainer system (described at length in *THE IRON AGE* of Sept. 11), on a No. 6 Bliss press, piercing four 0.411-in. holes in 5/16-in. stock.

Metal sawing machines of hacksaw, bandsaw and abrasive-wheel types, bar and billet shears, sanding, polishing and grinding equipment, and die sawing, filing and cutting machines were exhibited. A polishing wheel set-up machine, for which labor saving and increased life of wheels are claimed, was shown for the first time. Grinding wheels for all purposes, including snagging, were displayed, as well as electric rivet and bar heaters. A die-casting machine of large size, 12 x 16 in., together with a comprehensive exhibit of parts made on such equipment, was a center of interest.



Special Saw Removes Wings From Clover-Leaf Billets

FOR a steel company that casts a three-wing billet of clover-leaf design, the Peerless Machine Co., Racine, Wis., has furnished the special metal sawing machine here illustrated.

The billet wings are of various dimensions up to 10 x 10 in. The billet, which is 4 ft. long, is placed lengthwise in the two vises in front of the long table, one wing resting on the

table. This wing is then clamped in the spring-equipped fixtures shown. The saw frame then moves longitudinally, carrying the reciprocating saw blade through the fin for a distance of 4 ft. or more. When cut off from the billet, the wing rests on the table. The billet is then turned over and the next wing removed in the same manner.

Synchronous Motors for Varying Industrial Use

WIDESPREAD use of synchronous motors in industry dates from the time these motors were provided with squirrel-cage windings in the pole faces for starting, and were thus

able to start and accelerate to full speed with at least a part of their full load. Torques now available in synchronous motors have been largely responsible for a greatly enlarged

market for this type. Many applications, now driven by synchronous motors, were considered totally unsuited only a few years ago. Elimination of the need for clutches, and simplification of control made possible by full-voltage starting, have done a great deal to popularize their use.

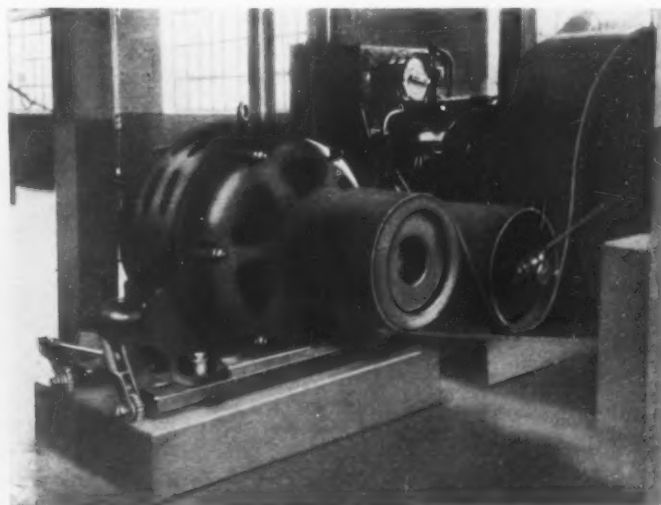
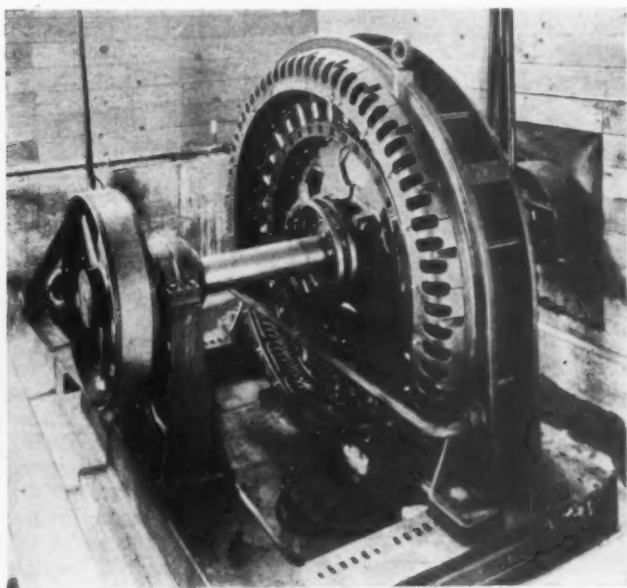
An extensive line of synchronous motors incorporating these operating features is being made by Fairbanks, Morse & Co., Chicago. This organization has broadened its line to cover ratings from 20 to 10,000 hp. in low and high-speed types. These motors have anti-friction bearings, and stators with cast semi-steel skeleton frame ends of boltless, nutless and threadless construction. Bolts and nuts, when applied to large heavy-duty rotating electrical machinery where vibrating problems are encountered, have been supplanted as one of the requirements of better construction.

The entire stator core is compressed evenly to the desired pressure by means of a powerful hydraulic press. While under this pressure the stacking pins are welded to form a flat countersunk head, which effectively prevents loosening or shifting of the core laminations.

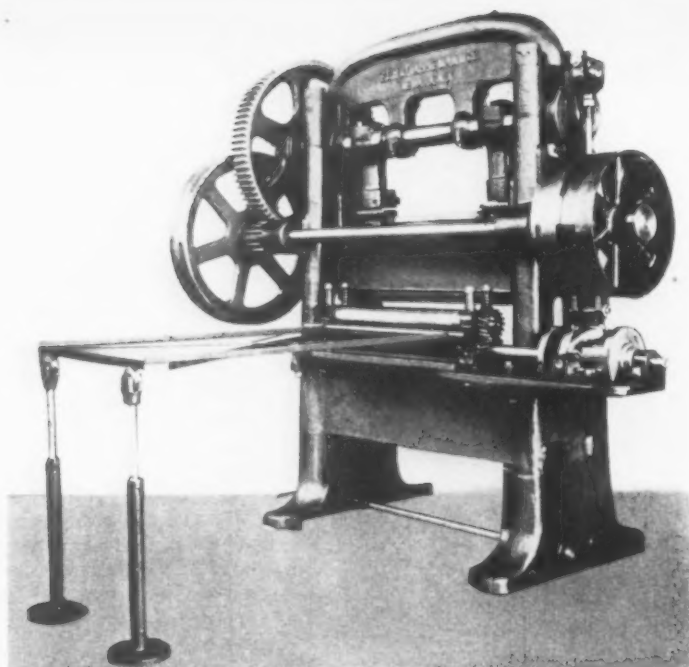
Liberal use of copper and iron has resulted in a balanced design and better than ordinary efficiencies, it is said, not only at full, but also at partial, loads. This important feature is reflected in economical operating costs of machinery which is in use for long periods at either full or part loads.

The starter is simple and requires no skill to operate. It is similar to the across-the-line starter used for small and medium-size induction motors.

But, in addition to the main-line magnetically-operated line switch and overload relay, it has a relay-actuated automatic field switch, which closes the field circuit at a predetermined point as the motor approaches synchronous speed. The field switch opens automatically when the motor stops.



The direct-drive unit is of 500 hp. at 240 r.p.m. The belted unit was applied to an existing compressor in an industrial plant, primarily for power factor improvement



Press for High-Production Blanking of Small Parts

TRANSFORMER laminations and other small parts can be blanked in large quantities on the double crank power press brought out by the Zeh & Hahnemann Co., Newark, N. J. Automatic roll feed is provided and the sheets may be cut without previous slitting, a feature emphasized as saving time and reducing waste of material.

Five dies are used and the press

makes 50 strokes a minute, giving an output of 250 blanks a minute. The feed works on the stagger principle: Forward, punch; to the right, punch; forward, punch; to the left, punch; etc.

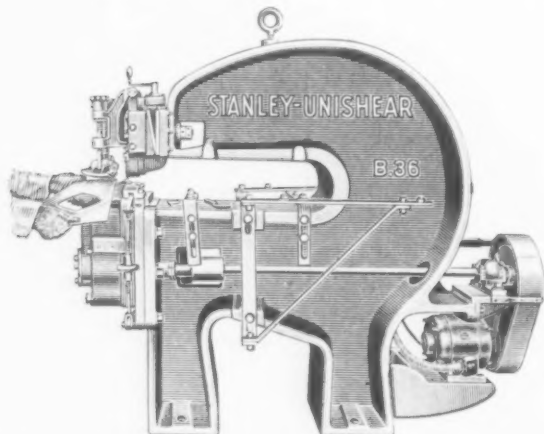
The distance between uprights is 48 in. and the machine will handle sheets up to 36 in. wide and 8 ft. long. The pressure exerted is 50 tons. The press weighs 10,000 lb.

Unishear Will Cut 1/4-In. Material

A TYPE B model of its Unishear with capacity for cutting steel boiler plate 1/4-in. thick has been brought out by the Stanley Electric Co., New Britain, Conn.

The standard machine has a 36-in. throat, measures 2 x 6 x 6 ft., and weighs approximately 5500 lb. It will cut at speeds up to 10 ft. per min., depending upon how fast the operator guides the sheet through the shears, and even on the large sheets the op-

erator has a clear view and can follow easily and accurately the outline to be cut. Inside cuts can be started at any point within the sheet without making a "starting hole." Any type curve can be cut, as well as circles, with a minimum radius of 6 in. on 1/4-in. material and less than 3-in. radius on lighter material. The machine will cut or trim the edges of flat stock to within less than the thickness of the sheet.

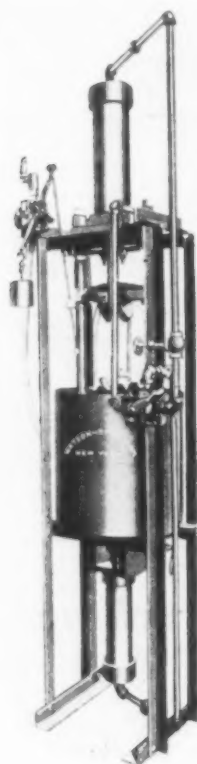


The standard machine with 36-in. throat cuts at speeds up to 10 ft. per min. Inside cuts can be started at any point

Either belt or motor drive can be supplied; for the latter a 2 hp. motor, built into the machine, is employed. The same machine with 50-in. throat can be furnished; the 50-in. throat Unishear measures 3 x 7 x 9 ft. and weighs 7500 lb.

Steam and Water Fittings Tested Rapidly

ALTHOUGH designed primarily for the rapid testing of brass steam and water fittings, the machine here shown, which is built by the Watson-Stillman Co., 75 West Street, New York, may be used also for fittings



made of cast iron, malleable iron, cast steel and other materials. All fittings, 45 and 90 deg. elbows, street elbows, tees, crosses and return bends in sizes up to 1 1/2 in. can be tested in one machine at an air pressure of 50 lb. per sq. in. under water with 90 lb. operating pressure. They can be tested either before or after tapping and at a speed of 500 to 600 per hour. This testing eliminates production work on defective castings and also tearing down time in installation costs.

In operating the machine the fitting to be tested is placed in a die on the lower platen. The valve at the right of the press controls the top double-acting piston, which on its down stroke clamps the fitting in the dies and forces the fitting under water in the tank. When the fitting is under the water, the air pressure is turned on automatically by the valve at the left on top of the frame. Reversing the valve at the right returns the top piston to the loading position.

Steel Production Out of Line with Demand

BY LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

THERE can be little question that raw steel has been produced in excess of finishing requirements.

During the first quarter, orders from consumers of finished steel showed a sharp spurt and ran much ahead of the last quarter of 1929. Perhaps this fact influenced the ill-advised attempt of that period to get business out of bed too soon. Orders for finished steel fell off in the second quarter, and in August reached the lowest point since 1924. This recession in buying reflects the facts as to the requirements of the steel-consuming industries, which, of course, must govern in the long run.

There was only a small, temporary increase in the activity of the chief steel-consuming industries in January and February. Since then the trend has been downward. In August the indicated current requirements continued the decline, falling considerably below the lowest point of 1924. This obviously explains the decline in orders for finished steel.

Meanwhile, however, no proportionate curtailment in steel ingot production has occurred. In August the average daily output actually increased more than usual for the season. The result is one of the largest discrepancies on our record between the outturn of raw steel and the indicated requirements for finished steel. This is the more difficult to understand in that the actual buying of finished steel and the unfilled orders of the Steel Corporation have fallen so low.

Survey of Particular Industries

Is there any early prospect of a considerable increase in the actual requirements of steel-consuming industries?

Automobile manufacturers continue to curtail and to adjust their production to a reduced volume of sales. This fact is clearly illustrated by the decline in orders for malleable steel castings, which in August reached the lowest level since 1921, or early 1922. The head of the largest motor manufacturing

company has definitely stated his opinion that recovery will be slow. Certainly no turn is yet in sight.

Railroads show a continued recession in freight traffic and in earnings. The tonnage hauled in August increased less than seasonally, and current earnings reports afford little hope of increased railroad buying. The surplus of freight cars is the largest in many years and orders for equipment are disappointing.

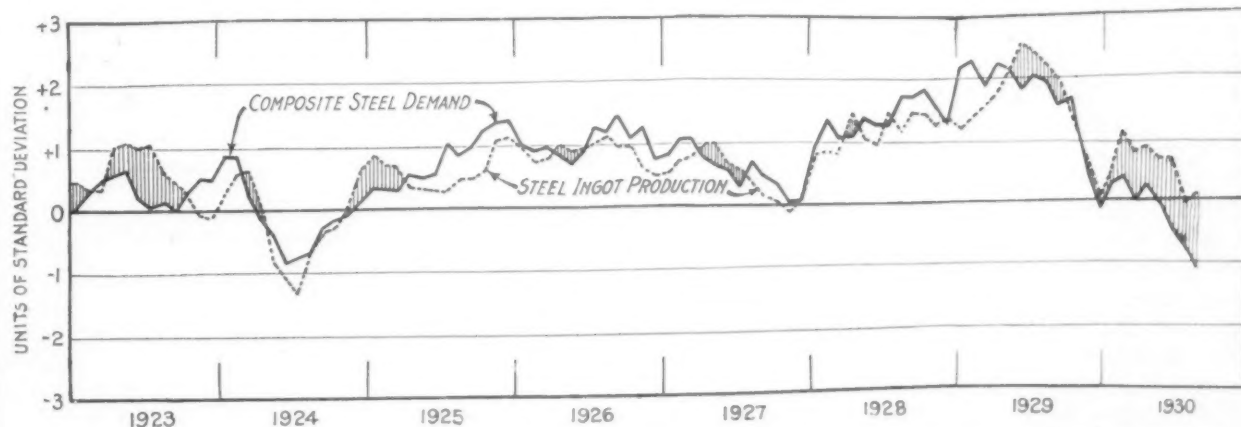
Construction Contracts Reflect Over-Production

Building activity continues to "scrape bottom" and, in August, construction contracts awarded (floor space) were the lowest since July, 1921. Building permits declined also. As there is no doubt that this is a case of over-construction, the response to easy money and an improved bond market will be slower than usual. Hence the bookings of fabricated structural steel can show no sustained rise during the next few months, having already passed the seasonal peak. Current weekly estimates indicate lower levels.

Miscellaneous *manufacturing* activity has shown a steady downward trend since April. The trend is toward curtailment in the *oil* industry, and that trend is now reinforced by weakness in markets for refined oils. The present *agricultural* situation is not one to suggest hopefulness as to increased steel purchases by farmers. The condition of *foreign* markets is well known.

About the only bright spots in the statistics are the August increase in machine tool orders and the upturn in the P-V line. But the former increase was less than that which occurred in the same month in each of the three preceding years, and the latter barometer is still hesitant and much below normal.

It is difficult to escape the conclusion that over-production of raw steel exists and that further recession in ingot production will be required.



Spread Between Production and Demand, the Greatest Since 1920, Was Accentuated in August. Further recession in ingot output is indicated.

W. W. MACON
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

(ESTABLISHED 1855)

Wheat and Business Recovery

RESURGENCE of pronounced pessimism in Wall Street has thrown a wet blanket on general business sentiment. One need only suggest that improvement in trade is at hand and the answer given is, "Wheat." And if one has the courage to state that betterment is actually under way, the crushing retort is, "Wheat, corn, cotton, copper, South America, Hitler."

But low commodity prices and political disturbances are not unusual concomitants of a depression; nor do they mean the indefinite prolongation of poor business. As the *New York Times* points out in its financial column, every major economic reaction passes through three stages—panic on the stock exchange, decline in commodity prices and, finally, agricultural distress. "Rapidly falling markets for industrial products," it states, "came into view soon after the Wall Street crash of 1920, but the period of extreme mental depression (in the financial community) was not reached until wheat and cotton had gone in 1921 to pre-war prices."

It might be added that the lot of our farmers today, bad as it is, is far better than nine years ago, when a disastrous collapse of inflated land values accompanied the decline in crop prices. Yet the acute agricultural troubles of that period did not prevent industry from making slow, but steady, progress toward recovery. The turning point in iron and steel came as early as July, 1921, when production reached its lowest level. While it is true that business did not get back to normal in a single bound, the general trend, ignoring temporary setbacks, was upward the rest of the year and through 1922 until prosperity again came into full bloom in the year 1923.

If the lesson of those years means anything, it is a counsel of patience. Those who looked for full business recovery this fall will be disappointed. Still there is reason to hope that the betterment that has made its appearance to date will continue. This expectation is heightened by points of similarity in the iron and steel trade in the two depression years. In both 1921 and 1930 the low ebb in steel production was reached in July. In August, 1921, the Steel Corporation reported a decrease of 298,398 tons in its unfilled orders; this year it reported an August decline of 441,851 tons. In September, 1921, there was a gain of 28,744 tons in unfilled tonnage, followed by a decrease of 273,841 tons in October. The rate of steel ingot production in September, 1921, increased 9.3 per cent over that of August; the September gain over August this year may prove no greater and probably will be less. But the October increase over September in 1921 was 35 per cent and

this was followed by a further gain of 2.67 per cent in November. December showed the usual year-end falling off, after which there was an uninterrupted rise until July, 1922.

Improvement in the iron and steel trade in 1921 did not start with an increase in the consumption of metal, but rather with the necessity for replenishment buying, following exhaustion of inventories. Purchases of a similar character have been in evidence in the iron and steel market of late.

Betterment in production in 1921 did not prevent further recessions in prices. Advances occurred in pig iron and there were efforts also to stabilize finished steel prices, but November and December brought fresh reductions and the lowest prices of the depression were reached in February, 1922.

The course of business this year and next will not necessarily follow the pattern of the earlier period, but it seems entirely probable that progress toward business recovery will come in waves rather than in an uninterrupted rise of production and prices.

Railroad and Utility Earnings

WHEN earnings of manufacturing and mining industries are falling sharply, one turns to the utilities and railroads to see what is happening to them. The Department of Commerce report on earnings of the utilities just issued for July contains a surprise, for the gross is above a year previous while there is a decline in net. The general trend in recent years has been for the net to increase less in dollars but more in percentage than the gross.

The utilities considered include gas, electric light, heat, power, traction and water and exclude telephone, telegraph and railway. Comparing full years, gross increased 5.5 per cent in 1928 and 3.5 per cent in 1929, while net increased 12.1 per cent and 15.9 per cent, respectively. Comparing the first seven months of this year with the same period of last, gross increased 3.0 per cent and net 3.5 per cent.

It is a notable thing that there should be any increase at all in gross this year and particularly an increase only a trifle under increases previously shown. Why the net thereupon had only a small increase relative to previous increases is not clear. From the bare figures the guess would be that there was an increase in unit operating costs.

Industrial production, freight car loadings and bank debits have been showing some progressive loss this year after allowance is made for seasonal variation and it is of interest to note the experience of the utili-

ties in this respect. Comparison of this year with last year is inadvisable as last year was particularly active in its middle part. Comparing receipts of the utilities this year with corresponding months of 1928, January showed a certain increase, February and March smaller increases, April and May slightly larger increases than January, and then June and July slipped off by increasing amounts. July showed only half the increase of January. The showing is particularly broad since part of the receipts come from business enterprises and part from households.

As to the railroads, the trend in net railway operating income was upward after 1920 through 1926. In 1927 there was a backset and in 1928 a partial recovery, whereupon 1929 passed 1926, thus becoming the best year. Comparing the first seven months of this year with the same period of last year there was a decrease of 33.1 per cent. The decrease in total operating revenue was only 13.2 per cent but operating expenses and taxes decreased by smaller percentages, whereby there was a large decrease in net. The operating ratio had a corresponding adverse movement, rising from 72.77 per cent to 76.38 per cent.

The showing for July tells an interesting story of increased rigidity in railroad economies. Operating revenue decreased from the preceding July by 18.2 per cent, or more than the seven-month average, but net railway operating income decreased barely more than in the seven-month period, 33.2 per cent against 33.1.

In substantially the whole range of activities, bank debits, car loadings, industrial production, utility earnings and railroad earnings, there is such a uniform showing, of losses this year from last, and increasing losses as the months of this year passed, that when the turn comes, as presumably it must, it will be quickly and plainly reflected, and the testimony will be perfectly trustworthy.

Still Burning Gasoline

STATISTICS of gasoline consumption show that it is this year running ahead of 1929 and this is one of the most reliable of statistical series, inasmuch as it represents the payment of money. The increase occurs notwithstanding the growing vogue of light cars that use the minimum of gasoline per mile. We draw the conclusion that the use of automobiles has not been curtailed. On the other hand the manufacture of automobiles has shrunk sadly. We draw the conclusion that their makers surfeited the market in 1929. The conclusion is equally sound that when the accumulated stocks, including the second-hands, have been absorbed and more of the junks have to be withdrawn from the roads, there will be a renewed demand for these vehicles, which have become a necessity in our life.

Steel Production Here and Abroad

THERE has been astonishing harmony between the swings of steel production here and the swings abroad. From 1928 to 1929 United States production increased 9 per cent while production in Great Britain, Germany, France, Belgium and Luxemburg increased 8.9 per cent. In the first seven months of this year the United States rate decreased 15.6 per cent from that of 1929, while the rate in the foreign countries decreased 12.6 per cent.

People are disposed to put it in the "believe it or not" column that trade in the United States is greatly and promptly influenced by what goes on abroad. They argue that, while one cannot see exactly why we should be so influenced, the facts speak for themselves. After all we are all human and peoples of various countries may do the same things without being greatly influenced by each other.

Whatever may have been the forces at work, it is clear that there were individual swings in the foreign countries, percentage increases in steel production 1928 to 1929 having been as follows:

Steel Production Increases, 1928 to 1929

United States	9.0
Great Britain	12.3
Germany	12.0
France	3.1
Belgium	4.1
Luxemburg	5.4

On account of much import and export business the changes in production in individual countries do not count for so much, the total being typical of the general swing in steel demand. Thus France had a small increase in production 1928 to 1929 but had a decrease in exports whereby the domestic consumption had a substantial increase. Germany, with a large increase in production, had a decrease in imports and an increase in exports, whereby domestic consumption increased but little.

Comparing the year 1929 and the first seven months of this year the percentage decreases are as follows:

Production Decreases, 1929 to 1930

United States.....	15.6
Great Britain	11.5
Germany	21.1
France	0.1
Belgium	10.2
Luxemburg	13.7

Germany's large loss is in domestic consumption, exports having decreased by a smaller percentage than production. France, with an insignificant decrease in production, had a decrease in exports, whereby the apparent domestic consumption actually increased this year. The average of the five foreign countries is the important thing, with a decrease of 12.6 per cent in their total tonnage of production, against 15.6 per cent in the United States.

Ordinarily a seven-month comparison of production here and abroad would not closely depict the situation because we have a seasonal swing to a low summer rate, not observable abroad, but this year the foreign countries have acted differently from usual, all of them having sharp decreases after March, which was the high month of the seven in all but Germany. Probabilities are that the figures for the entire year 1930 will make much the same comparison between here and abroad as is made by the seven-month comparison.

THREE of the recent developments in the engineering industries still are holding the spotlight. This was attested by the National Metal Congress in Chicago last week. They are the rustless and stainless steels, the nitriding process and the tungsten-carbide cutting tools. Increasing numbers show keen interest in the numerous applications. It is the advanced investigative stage that comes after skepticism or indifference has been dispelled.

National Metal Congress Listens to Nearly 100 Papers

ELEVEN years ago in Chicago a little band of steel treaters held a convention and exhibition in a South Side armory. It was the inauguration of what has come to be known as the American Society for Steel Treating. There was one chapter then. Today the still young society owns 38 chapters and local groups.

The 1930 convention and exposition in Chicago, last week, were held at the Stevens Hotel. Both from a technical and exhibition aspect, this year's gathering was a pronounced success, in view of business and other conditions. Participating, by holding sessions of some of their professional divisions, were the American Institute of Mining and Metallurgical Engineers, the American Welding Society and the American Society of Mechanical Engineers. Some idea of the magnitude of the technical programs is obtained from the accompanying table.

Society	Sessions	Papers
A.S.S.T.	10	39
A.W.S.	8	21
A.S.M.E.	8	18
A.I.M. and M.E.	7	20
Totals.	33	98

Three Notable Features

An experiment by the A.S.S.T. was a session on salesmanship. The attendance of nearly 700 overflowed the north ballroom of the hotel. Donald B. Clark, Firth-Sterling Steel Co., McKeesport, Pa., was chairman.

One of two particularly notable events in the technical program was the Campbell memorial lecture on "Oxygen in Steel" by Dr. Marcus A. Grossmann, a deliverance that has come to be a feature of the annual A.S.S.T. convention.

The other event was a joint session of the two divisions of the A.I.M. and M.E. on theoretical metallurgy. With Dr. S. L. Hoyt, General Electric Co., Schenectady, N. Y., as chairman and Dr. Grossmann as vice-chairman, three unusually important papers were delivered. They were: "Studies Upon the Widmanstaetter Structure, I—Introduction; also the Aluminum-Silver System and the Copper-Silicon System," by Robert F. Mehl and Charles S. Barrett; "Cemented Tungsten Carbide—A Study of the Action of the Cementing Material," by L. L. Wyman and F. C. Kelley; "Transformation of Austenite at Constant Subcritical Temperatures," by E. S. Davenport and E. C. Bain.

In the audience and partaking in the discussion were notables of physical metallurgy and chemistry. At the dinner of the A.I.M. and M.E. that same evening, Dr. Zay Jeffries characterized the papers at that session as landmarks in the study of the subjects treated.

Nitriding and Stainless Steels Covered

Last year at Cleveland a notable symposium on nitriding was the feature of an all-day program. This year

this live subject was by no means neglected. The A.S.S.T. arranged a session of five papers and there were also two papers in the A.S.M.E. program. And the rustless or stainless steels were discussed.

Sessions by Other Societies

An unusually successful gathering marked the annual fall meeting of the A.W.S. at the Congress Hotel. The 21 papers at the eight sessions covered several important subjects, including welding of rustless steel and a symposium on testing of welds.

Splendid programs were carried through by the two divisions of the A.I.M. and M.E. The 18 papers of the A.S.M.E. meetings embraced machine shop and steel industry problems.

High Praise for the Campbell Lecturer

COMMENT was general and spontaneous that the Campbell memorial lecture this year—the fifth since its inauguration—was a notable contribution. It was delivered before a crowded assemblage of nearly 700 by Dr. Marcus A. Grossmann, Republic Steel Corporation, Canton, Ohio, on the subject "Oxygen in Steel." The facts and theories presented "form an epoch in the discussion" of this subject. A feature was the clarity and conciseness of its presentation.

In introducing Dr. Grossmann, Dr. Albert Sauveur, the chairman, himself
(Continued on page 973)



J. M. Watson



A. H. D'Arcambal



M. A. Grossmann



H. J. French

New president for 1931 is Mr. Watson, with Mr. D'Arcambal the new vice-president. Dr. Grossmann, delivered the Campbell memorial lecture and Mr. French was awarded the Howe medal.

Demand for Finished Steel Loses Momentum

BUSINESS in iron and steel is holding its recent gains, but has shown little further expansion. Reports from different market centers are not of one tenor and, while the balance is still on the side of betterment in demand, there is no clear indication of progressive improvement ahead.

The moderate increase in steel buying during the past month may prove to have been occasioned mainly by exhaustion of inventories rather than by any appreciable change in actual consumption. Much of the recent activity in both pig iron and finished steel has been centered in forward contracting, although willingness to make future commitments has been by no means general either as to products or districts. The contract tonnage that has been placed will prove effective in raising iron and steel output only to the extent that it is released for shipment.

In the case of sheets, unfilled tonnage was expanded sufficiently in September to warrant a rise of 15 or 20 points above the present 50 per cent rate of mill operations if material is specified fully and regularly during the coming quarter. But the flow of shipping orders, in the last analysis, will depend on the trend of iron and steel consumption.

With growth of steel demand arrested, ingot production remains unchanged at 61 per cent of capacity.

The loss of momentum in steel buying, possibly influenced by stock market pessimism, has been concomitant with a further divergence in price tendencies. Scrap markets are uniformly weak in tone, and heavy melting grade has declined 50c. a ton at Pittsburgh. On the other hand, bars are now being held at 1.65c. a lb., Pittsburgh, an advance of \$1 a ton, and recent advances of \$2 a ton on light plates and blue annealed sheets seem fairly well established. But attempts to raise automobile body sheets from 3.50c. to 3.60c. have thus far proved unsuccessful.

In the pig iron market, price recessions reported a week ago have been followed by further breaks, brought out by the appearance of the largest inquiries in months. Both basic and foundry grades are off 50c. a ton at Philadelphia, and Buffalo iron for delivery on the Atlantic seaboard has declined an equal amount.

The steel trade has not given up hope of a further gain in business during the coming month, although unwilling to estimate its extent. Recent releases

▲ ▲ ▲
PRODUCTION Makes No Further Gain—Pig Iron Prices Decline on Eastern Seaboard—Scrap Off 50c. a Ton at Pittsburgh
▼ ▼ ▼

against old rail contracts have been in encouraging volume, clearing the books of tonnage which the railroads were tardy in specifying. Fresh rail contracts from four major lines that bought a total of 300,000 tons last fall are soon to be placed, and will likely result in heavier rail mill operations at Chicago before the end of October. The Boston & Albany has purchased 1900 tons of tie plates, and the Baltimore & Ohio has entered the market for 50 locomotives.

Motor car production is apparently sensitive to every shift in retail sales. The Ford Motor Co. reduced its operations to a three-day basis last week and may continue on that schedule during the current week. On the other hand, the Chevrolet foundry at Saginaw, Mich., got into production on Sept. 22 and its operations in the next 30 days will be heavy. Other departments of the Chevrolet company are speeding up also, in an effort to put new models on the market by Nov. 1. It is largely because of this organization's increased activity that total automobile output for the coming month is expected to prove a little larger than that of September.

Demand for wire products has turned upward in the Chicago district with a corresponding improvement in wire mill operations. Tin mill operations are beginning to react to seasonal influences, now averaging 65 per cent for the country at large. Fabricated structural steel awards, at 15,000 tons, were the smallest to date this year, while new projects, at 24,000 tons, were below average. Lettings of reinforcing steel, totaling 10,850 tons, were the largest since May.

Iron and steel exports in August, at 151,235 tons, made the first gain since March, the increase over the July total being 19,463 tons. The figures for September will be awaited with particular interest, since it is feared that political disturbances in South America have adversely affected shipments to that continent.

Copper, in dropping to 10c. a lb., delivered Connecticut valley, reached the lowest price in 34 years. Spot straits tin has been sold at 28.62½c., the lowest price since March, 1922.

THE IRON AGE composite price for finished steel has advanced from 2.149c. to 2.156c. a lb. Pig iron has declined from \$16.46 to \$16.38 a gross ton. The scrap composite has receded from \$13.75 to \$13.58 a gross ton.

PITTSBURGH

No Definite Upturn in Steel Business— Scrap Prices Decline

PITTSBURGH, Sept. 30. — September business in the steel industry, while it may have added considerably to order books, has not yet given the industry sufficient momentum to bring about a definite upturn. In the Pittsburgh district operations have shown no gain during the entire month, with one or two minor exceptions. A small independent plant, which began the month with open-hearth capacity unoccupied, is now running four furnaces, but other independents have done well to maintain recent averages. The leading interest has maintained its output at about the level which prevailed early in the month.

Specifications last week for sheets, strip steel and other light products were not maintained at the comparatively high level which prevailed in the second and third weeks of September. Consequently, the gain in tonnage releases in the past month has not been as marked as was indicated by earlier comparisons. On the other hand, improvement in demand for bars, plates and shapes seems still to be in evidence, and may likely be reflected in next month's operating schedules. Considerable structural steel business is being placed, and more activity is reported in the barge market. Valley mills have also booked a fair amount of plate tonnage for oil tanks. Electric welded pipe mills in that district are drawing heavily on plate mills for their skelp. The railroads have not yet started to buy in any significant volume, and the outlook for automobile steel is further clouded by a reduction in the operating schedule of the largest maker last week.

Miscellaneous consumers of steel in many cases have covered their needs for the remainder of the year.

The price situation is somewhat clouded. Although the market still seems inclined to show strength rather than weakness, on some products this probably arises from the fact that the principal consumers are now covered for the remainder of the year and have withdrawn from the market. In many cases such business was taken at price concessions, and mills have adopted a firmer stand on business which is coming out now. Some of them feel backlogs accumulated recently justify a stronger adherence to current quotations, but others are not so certain that this tonnage will be specified before the end of the quarter. Bars have probably shown the most marked tendency toward strength in recent weeks, and the 1.65c., Pittsburgh, quotation may be considered the general market. Likewise 1.60c. is better established on plates and shapes. Prices on black and blue annealed sheets are also stronger, but

Although there have been some gains in steel orders in September, there is no definite upturn in plant operations.

* * *

Price situation still clouded. Bars are firmer, but shading occurs on sheets in some districts.

* * *

Heavy melting steel scrap off 50c. a ton, and other grades are also lower.

* * *

Recent declines in pig iron prices have not stimulated buying.

* * *

Further curtailment of blast furnace operations in the Valleys.

reports of shading in other districts continue, even on current spot business.

Pig iron reflects no improvement from the standpoint of advance orders, and shipments have gained only in isolated cases. The recent price decline apparently did not stimulate buying, and the present quotations are still essentially small-lot figures. Heavy melting scrap has declined 50c. a ton in the absence of further mill buying to support the recent quotations, and dealers are offering tonnage at even lower figures.

Semi-Finished Steel

No change is reported in this market, which has not reflected recent improvement in buying of finished steel products. Shipments during September showed only a limited increase over the preceding month, and new buying is negligible. Users of forging billets have generally contracted for the fourth quarter at \$36, Pittsburgh, while the same is true in the case of wire rods. Low operations of bolt and nut makers and other large rod users have restricted shipments, although moderate improvement this month over August is reported by most sellers. The price seems to be well maintained.

Pig Iron

Recent declines of \$1 a ton on basic iron and 50c. on the other grades have not stimulated buying in this district, and business is still confined to small orders for immediate shipment. Foundries in the district are generally operating only two or three days a week, and are covering their needs from

hand to mouth. Following the recent large sale of basic iron to a non-integrated steel company, the basic market is again without feature. Most of the other large basic users are tied up by contract with their sources of supply, and it is difficult to determine whether the present \$17, Valley, price would stand the test of further heavy buying. Blast furnace production has reached the lowest point in years, with further curtailment of operations in the Valleys following the blowing out of the second Shenango stack. The furnace of the Sharon Steel Hoop Co. has been taken out for relining, while one of the Hubbard furnaces of the Youngstown Sheet & Tube Co. is temporarily banked.

Prices per gross ton, f.o.b. Valley furnace:

Basic	\$17.00
Bessemer	18.00
Gray forge	17.00
No. 2 foundry	17.50
No. 3 foundry	17.00
Malleable	18.00
Low phos., copper free	\$26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:

Basic	\$17.50
No. 2 foundry	18.00
No. 3 foundry	17.50
Malleable	18.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

Bars, Plates and Shapes

Prospective business in fabricated structural material is still the feature of heavy hot-rolled products. Local fabricators are figuring on more jobs than they have had at any time during the year, and a number of awards are being made. Highway bridges are accounting for more tonnage than any other one outlet just now, as industrial and office building construction is very limited in the immediate Pittsburgh district. Bids will be taken Sept. 22 on a viaduct at Cincinnati, which will take 5000 tons of shapes. A boulevard bridge at Pittsburgh for the State will take 760 tons. The Gulf Refining Co. has not yet acted against its recent barge inquiry, and there is a possibility that the original plans to buy only six barges will be changed to a larger number.

One steel company in the district is reported to be considering barge purchases before the end of the year, and it is said that an independent barge line may soon be in the market for as many as 40 units. Otherwise, actual inquiry is rather scanty, although local builders are figuring on a few single barges. Demand for plates is rather dull, particularly because of the inactivity of car building plants in this district. Some material is going to oil tank fabricators, and ac-

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Sept. 30, 1930	Sept. 23, 1930	Sept. 2, 1930	Oct. 1, 1929
No. 2 fdy., Philadelphia.....	\$18.76	\$19.26	\$19.76	\$21.26
No. 2, Valley furnace.....	17.50	17.50	18.00	18.50
No. 2 Southern, Cin'tl.....	15.19	15.19	15.69	17.19
No. 2, Birmingham.....	14.00	14.00	14.00	14.50
No. 2 foundry, Chicago.....	17.50	17.50	17.50	20.00
Basic, del'd eastern Pa.....	17.75	18.75	18.75	19.75
Basic, Valley furnace.....	17.00	17.00	18.00	18.50
Valley Bessemer, del'd P'gh..	19.76	19.76	20.26	20.76
Malleable, Chicago.....	17.50	17.50	17.50	20.00
Malleable, Valley.....	18.00	18.00	18.50	19.00
L. S. charcoal, Chicago.....	27.04	27.04	27.04	27.04
Ferromanganese, furnace....	94.00	94.00	94.00	105.00

Rails, Billets, Etc., Per Gross Ton:	Sept. 30, 1930	Sept. 23, 1930	Sept. 2, 1930	Oct. 1, 1929
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh..	31.00	31.00	31.00	35.00
Sheet bars, Pittsburgh.....	31.00	31.00	31.00	35.00
Slabs, Pittsburgh.....	31.00	31.00	31.00	35.00
Forging billets, Pittsburgh...	36.00	36.00	36.00	40.00
Wire rods, Pittsburgh.....	36.00	36.00	36.00	40.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb...	1.70	1.70	1.70	1.85

Finished Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.65	1.60	1.60	1.90
Bars, Chicago.....	1.70	1.70	1.75	2.05
Bars, Cleveland	1.65	1.65	1.70	1.95
Bars, New York.....	1.98	1.98	1.93	2.24
Tank plates, Pittsburgh.....	1.60	1.60	1.60	1.95
Tank plates, Chicago.....	1.70	1.70	1.75	2.05
Tank plates, New York.....	1.88	1.88	1.88	2.22½
Structural shapes, Pittsburgh..	1.60	1.60	1.60	1.90
Structural shapes, Chicago...	1.70	1.70	1.75	2.05
Structural shapes, New York...	1.85½	1.85½	1.80½	2.19½
Cold-finished bars, Pittsburgh..	2.10	2.10	2.10	2.30
Hot-rolled strips, Pittsburgh..	1.65	1.65	1.65	1.90
Cold-rolled strips, Pittsburgh..	2.35	2.35	2.35	2.75

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh...	2.45	2.45	2.40	2.85
Sheets, black, No. 24, Chicago dist. mill.....	2.55	2.55	2.50	2.95
Sheets, galv., No. 24, P'gh...	3.00	3.00	3.00	3.50
Sheets, galv., No. 24, Chicago dist. mill.....	3.10	3.10	3.10	3.60
Sheets, blue, No. 13, P'gh...	2.15	2.05	2.05	2.35
Sheets, blue, No. 13, Chicago dist. mill.....	2.25	2.25	2.25	2.45
Wire nails, Pittsburgh.....	2.00	2.00	2.00	2.45
Wire nails, Chicago dist. mill.	2.10	2.10	2.10	2.50
Plain wire, Pittsburgh.....	2.30	2.30	2.30	2.40
Plain wire, Chicago dist. mill.	2.35	2.35	2.35	2.45
Barbed wire, galv., Pittsburgh	2.70	2.70	2.70	3.10
Barbed wire, galv., Chicago dist. mill.....	2.85	2.85	2.85	3.15
Tin plate, 100 lb. box, P'gh...	\$5.25	\$5.25	\$5.25	\$5.35

Old Material, Per Gross Ton:	Sept. 30, 1930	Sept. 23, 1930	Sept. 2, 1930	Oct. 1, 1929
Heavy melting steel, P'gh....	\$15.25	\$15.75	\$15.50	\$17.75
Heavy melting steel, Phila....	13.00	13.00	13.00	16.00
Heavy melting steel, Ch'go....	12.50	12.50	12.50	14.50
Carwheels, Chicago.....	13.50	13.50	13.50	14.00
Carwheels, Philadelphia.....	15.00	15.00	15.00	16.50
No. 1 cast, Pittsburgh.....	13.50	13.50	13.50	15.50
No. 1 cast, Philadelphia.....	13.00	13.00	13.00	16.00
No. 1 cast, Ch'go (net ton)...	11.00	11.00	12.00	14.50
No. 1 RR. wrot., Phila.....	15.00	15.00	15.00	16.00
No. 1 RR. wrot., Ch'go (net)...	10.00	10.00	10.00	14.00

Coke, Connellsville, Per Net Ton at Oven:	Sept. 30, 1930	Sept. 23, 1930	Sept. 2, 1930	Oct. 1, 1929
Furnace coke, prompt.....	\$2.60	\$2.60	\$2.60	\$2.65
Foundry coke, prompt.....	3.50	3.50	3.50	3.75

Metals, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	10.12½	10.50	11.12½	18.12½
Electrolytic copper, refinery..	9.75	10.25	10.50	17.75
Tin (Straita), New York.....	23.75	29.75	29.75	44.25
Zinc, East St. Louis.....	4.25	4.25	4.35	6.80
Zinc, New York.....	4.60	4.60	4.70	7.15
Lead, St. Louis.....	5.35	5.35	5.35	6.70
Lead, New York.....	5.50	5.50	5.50	6.90
Antimony (Asiatic), N. Y....	7.50	7.62½	7.75	8.50

tivity is well sustained at a few mills by the heavy skelp requirements of pipe makers.

Steel bars continue very dull, at least from the standpoint of production and specifications. Forward buying has been more active, and most of the contract buyers in this territory are now covered for the remainder of the year. The price is now very well maintained at 1.65c., Pittsburgh, the lower figure which has been quoted recently having practically disappeared so far as current business is concerned. Although it is admitted that a substantial part of fourth quarter shipments will not take that price, the market is now quotable on a flat 1.65c. basis. Plates and shapes are also better maintained at 1.60c., and the market reflects a generally steadier tone.

Rail and Track Supplies

Specifications have been heavier as the quarter approaches its end, and negotiations are under way for fourth quarter contracting. The rail buying movement has not yet appeared, although the Pere Marquette is inquiring for its 1931 requirements. Other roads are expected to come into the market during October.

Tubular Goods

The pipe market has not benefitted materially from the improved business in other steel lines since the first of the month, although a few makers report a slightly heavier demand for butt-weld goods. This does not indicate any substantial improvement in building operations, but follows a rather general seasonal trend. No new line pipe orders are reported, and projects under consideration are being postponed until next season. The leading interest has sufficient line pipe business on its books to maintain a steady operating rate over the remainder of the year, but the independents are scarcely as well supplied with orders. Demand for oil country goods is unsatisfactory, and other lines, such as mechanical tubing and boiler tubes, are quiet.

Wire Products

Specifications for manufacturers' wire still reflect improvement, but light demand from the automobile industry discourages any sharp upturn in business. Some jobbers are stocking up on merchant wire products, although demand is far from rushing. Fourth quarter quotations on staples and galvanized barbed wire indicate

an advance of 10c. a 100 lb. in the differential over nails at which such goods are sold. The price of nails is generally maintained in this district at \$2 a keg, Pittsburgh, and shading from outside sources is less frequently reported.

Sheets

The principal activity in this market still is centered in forward buying. Current specifications have not been sufficient to justify any marked improvement in operations. The leading interest ran its mills last week at about 51 per cent of capacity and the average for independent companies was not over 50 per cent. Minor increases are scheduled at some plants this week, but are not sufficient to make much of a change in the aggregate operating rate of the industry. The addition to unfilled sheet orders during September has undoubtedly been of considerable size and, if the material is specified with regularity during the fourth quarter, operations should improve 15 to 20 points. The prospect of regularity in specifying depends entirely upon the business of consumers and thus is none too good. Also steel companies as a whole are not very well protected in their con-

THE IRON AGE COMPOSITE PRICES

		Finished Steel	Pig Iron	Steel Scrap
Sept. 30, 1930		2.156c. a Lb.	\$16.38 a Gross Ton	\$13.58 a Gross Ton
One week ago		2.149c.	16.46	13.75
One month ago		2.142c.	16.88	13.67
One year ago		2.384c.	18.29	16.08
Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.			Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.
	High	Low	High	Low
1930.....	2.362c., Jan. 7;	2.142c., Aug. 26	\$18.21, Jan. 7;	\$16.38, Sept. 30
1929.....	2.412c., April 2;	2.362c., Oct. 29	18.71, May 14;	18.21, Dec. 17
1928.....	2.391c., Dec. 11;	2.314c., Jan. 3	18.59, Nov. 27;	17.04, July 24
1927.....	2.453c., Jan. 4;	2.293c., Oct. 25	19.71, Jan. 4;	17.54, Nov. 1
1926.....	2.453c., Jan. 5;	2.403c., May 18	21.54, Jan. 5;	19.46, July 13
1925.....	2.560c., Jan. 6;	2.396c., Aug. 18	22.50, Jan. 13;	18.96, July 7

tracts and many of them no longer have clauses forcing buyers to order out the steel before the end of the quarter. As considerable business has been taken at price concessions, the progress which has been made in price stabilization this month may be nullified unless unspecified tonnages are cancelled.

Prices today are steadier than they have been for some time on the common finishes of sheets. Current buying of black sheets is at 2.45c., Pittsburgh, with scarcely any exceptions, while light plates and blue annealed sheets are well maintained at 2c. and 2.15c. Galvanized material is quotable at 3c. to 3.10c., the lower figure applying to large jobbers. Automobile body sheets are not so well defined, with business going at 3.50c. to 3.60c.

Strip Steel

Further depressing reports from the automobile industry have not improved the sentiment of strip makers in the last week, and no additional gains in specifications are reported. In some instances encouraging improvement in the first two or three weeks of the month was not continued last week and the average gains over August were cut down. A fair average of the increase would be 10 per cent, while earlier in the month a number of companies were 20 per cent ahead of the corresponding August period. Nevertheless, prices have held fairly well and are currently steady except in one or two districts. Considerable contract business was taken at lower figures than are the quotable market today. Hot-rolled strip is quotable at 1.65c., Pittsburgh, for the wider sizes and 1.75c. for the narrow widths, while cold-rolled material is well maintained at 2.35c. to 2.45c.

Cold-Finished Steel Bars

The cold-finishing industry has not had much increase in business this month because of the predominant part of its tonnage which goes to the automobile industry, whose share is estimated at as high as 75 per cent when parts makers as well as motor car builders are considered. Slightly heavier releases are coming from the agricultural implement makers, but this business has not improved as much as usual. Other lines are dull and aggregate business in cold-fin-

ished bars this month has not gained materially over that of August. The price is well maintained at 2.10c., Pittsburgh.

Tin Plate

Tin plate operations have begun to react to the usual seasonal downturn, the average for the industry now being not much above 65 per cent. However, shipments to container manufacturers are still heavy in some parts of the country as packing operations have been extended past the usual time in an effort to make up shortages elsewhere.

Coal and Coke

Further curtailment in blast furnace operations in this and the Valley districts has brought added grief to furnace coke makers and oven operations are lower. Prices are holding at \$2.60 to \$2.65, Connellsville. Colder weather has stimulated demand for domestic coke, and some sellers are advancing prices. The coal market is burdened by considerable material on tracks without destination, and prices are weak. This is particularly true

in the case of steam slack, which has declined sharply in the last few days.

Old Material

No. 1 heavy melting steel has declined 50c. a ton in the absence of mill purchases. Even the present quotation of \$15 to \$15.50 is nominal, as one mill has been offered scrap in comparatively heavy tonnage at \$15 and has refused to buy. The same is true in the case of hydraulic compressed sheets, which are also off 25c. a ton. Dealers have generally covered recent high-priced orders for steel and bundles with the result that it is even difficult to arrive at a dealers' buying price in the present market. Some material is being picked up at \$15 or less, but not enough dealers are in the market to establish any definite buying figures. Blast furnace grades have declined 25c. a ton, and a market for machine shop turnings is still lacking. The closing of the Pennsylvania list on Oct. 1 is expected to establish a price for No. 1 heavy melting steel, although this might normally bring a higher figure than mills are willing to pay for less desirable material. The Baltimore & Ohio list, closing on Oct. 6, contains 8700 tons.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel...	\$15.00 to \$15.50
No. 2 heavy melting steel...	12.50 to 13.00
Scrap rails	14.50 to 15.00
Compressed sheet steel...	14.75 to 15.25
Bundled sheets, sides and ends	12.50 to 13.00
Cast iron carwheels	14.50 to 15.00
Sheet bar crops, ordinary	15.50 to 16.00
Heavy breakable cast	11.00 to 11.50
No. 2 railroad wrought	15.00 to 15.50
Hvy. steel axle turnings	12.50 to 13.00
Machine shop turnings	8.00 to 8.50
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	17.50 to 18.00
Railr. coil and leaf springs	17.50 to 18.00
Roller steel wheels	17.50 to 18.00
Low phos. billet and bloom ends	20.00 to 21.00
Low phos. mill plates	17.00 to 17.50
Low phos. light grades	17.00 to 17.50
Low phos. sheet bar crops	18.00 to 18.50
Heavy steel axle turnings	12.50 to 13.00
Electric Furnace Grades:	
Low phos. punchings	17.00 to 17.50
Heavy steel axle turnings	12.50 to 13.00
Blast Furnace Grades:	
Short shovelling steel turnings	8.50 to 9.00
Short mixed borings and turnings	8.50 to 9.00
Cast iron borings	8.50 to 9.00
Rolling Mill Grades:	
Steel car axles	21.50 to 22.50
Cupola Grades:	
No. 1 cast	13.00 to 14.00
Rails 3 ft. and under	16.50 to 17.00

Warehouse Prices, f.o.b. Pittsburgh

*Base per Lb.

Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.75c.
Reinforcing steel bars	2.75c.
Cold finished and screw stock—	
Rounds and hexagons	3.35c.
Squares and flats	3.85c.
Bands	3.10c.
Hoops	4.10c.
Black sheets (No. 24), 25 or more bundles	3.25c.
Galv. sheets (No. 24), 25 or more bundles	3.85c.
Light plates, blue annealed (No. 10), 1 to 24 plates	2.50c.
Blue annealed sheets (No. 13)	2.65c.
Galv. corrug. sheets (No. 28), per square	4.25c.
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count, 60 and 10 per cent off list	
Machine bolts, 100 count, 60 and 10 per cent off list	
Carriage bolts, 100 count, 60 and 10 per cent off list	
Nuts, all styles, 100 count, 60 and 10 per cent off list	
Large rivets, base per 100 lb.	\$3.30
Wire, black, soft ann't'd, base per 100 lb.	\$2.60 to 2.70
Wire, galv. soft, base per 100 lb.	3.20 to 3.30
Common wire nails, per keg	2.35
Cement coated nails, per keg	2.65 to 2.80

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 3999 lb.

CHICAGO

Steel Orders and Operations Gain Slightly— Further Expansion Expected This Month

CHICAGO, Sept. 30.—Although the general business situation is still clouded, there are a number of developments in the iron and steel market that are distinctly encouraging. Prices appear to have a better footing, which is rather a satisfactory condition in view of the current rate of consumption. It is evident that consumers are giving closer attention to future needs as they may relate to present quotations. Fourth quarter contracting is moving forward at a fair stride, and it is significant that inquiries, which are present in an attractive aggregate tonnage, are in some cases reaching beyond the end of 1930. Both specifications and sales of finished steel are well up to the total of the previous week, when gains were made, and shipments are registering improvement.

Steel mills continue to blow only 16 of 36 blast furnaces, but open-hearth output has gained at least one point to an average of 59 per cent for the district.

Specifications for wire and wire products showed improvement in the final week of September, and releases at hand point to further betterment in the early part of October. Of special significance are heavier rolling schedules at hot mills, which now are producing in the range of 60 to 65 per cent of capacity, a gain of at last five points in the week. Bar mill products are in stronger demand for widely diversified uses.

Reviewing the situation as a whole the Midwestern steel market enters October after an improvement in September and with fair assurance that the tonnage to be moved in October will show further growth.

Plates

Improvement in the Western plate market is slow to take shape. Specifications from car shops are the lightest in some time, and it is quite evident that production schedules on railroad cars are at the lowest point of the year. This situation in itself would not be so bad were it not for the fact that there is no new business of moment in sight.

Further, there is a strong disposition for railroads to confine their narrow wants to their own shops, where operations have been curtailed rather sharply in recent months. Examples of movements of this kind are announcements that the Burlington will build 10 baggage cars in its own shops and that the Milwaukee road will build 10 mail and baggage cars at its Milwaukee shops. The 50 tank cars recently inquired for by the Tennessee Copper Co. will be constructed and leased by the General Tank Car

Moderate improvement of September in steel orders and operations expected to extend through October.

* * *

Inquiries are increasing in number, some calling for deliveries into 1931.

* * *

Open-hearth operating rate has gained one point to 59 per cent of Chicago district capacity.

* * *

Bar mill products in stronger demand for widely diversified uses.

* * *

Pig iron shipments in September fully 15 per cent larger than those of August.

Corp. Orders similar to the above give a good general picture of the railroad equipment market, which at present seems to be drifting aimlessly without chance of recovery during the remainder of this year. Car business usually develops slowly, and it is not uncommon to see 60 or more days pass from the time that inquiries are made until actual work begins in shops. With inquiries at low ebb, no encouragement for 60 to 90 days can be drawn from this market.

The pipe market is leaning heavily on past commitments. Shipments of plates to the Milwaukee pipe fabricator are still in good volume, and releases at hand are promising for a number of weeks to come. Sinclair interests are planning a new oil line to extend from Oklahoma City to Coffeyville, Kan. The tank market is listless, with 20,000 tons overhanging from recent inquiries.

Pig Iron

September has come to a close with shipments of Northern foundry iron fully 15 per cent heavier than in the preceding month and shipping instructions now in the hands of sellers give assurance that October deliveries will show further improvement. Production is still confined to four merchant stacks, which are operating below rating as measured by the current rate of shipments. Prices remain steady at \$17.50 a ton, local furnace. New buying remains in substantial volume, while inquiries, sometimes for as far ahead as the first quarter and even the first half, are increasing in volume. A user in this district has taken upward of 1000 tons of low phosphorus iron at a shade under \$28.50 a ton, delivered Chicago. In view of general conditions, the local

pig iron market shows satisfactory improvement.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25.....	\$17.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75.....	18.00
Malleable, not over 2.25 sil	17.50
High phosphorus	17.50
Lake Super. charcoal, sil. 1.50	27.04
S'th'n No. 2 fdy.....	17.51
Low phos., sil. 1 to 2, cop- per free	\$28.50 to 29.20
Silvery, sil. 8 per cent....	26.79
Bess. ferrosilicon, 14-15 per cent	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Structural Material

Building construction in the Middle West remains quiet. It is reported that Western banks are quicker to renew mortgages than has been their practice in recent months and that more money is available for home building, which appears to be expanding. It is hoped by the trade that changes in attitude of money lenders may lead to larger building programs, but neither fabricators nor mills hold out much hope for business during the remainder of this year. Midland Structural Steel Co., Chicago, is low bidder on 2700 tons for the Steinmetz School.

Wire Products

As is to be expected at this time of the year, demand for wire and wire products is turning upward. Releases and new orders entered for immediate shipment show gains both from the jobbers and from the manufacturing trade. Wire mill operations stand close to 50 per cent of capacity and the outlook is that further gains will be made as October advances. Prices here are relatively steady at \$2.10 a keg for common nails and at 2.35c. a lb. for wire to the manufacturing trade.

Rails and Track Supplies

At least three major Western railroads and one line operating between Chicago and New York are said to have completed budgets and are near the point where they will ask for prices on standard - section rails. These same railroads bought close to 300,000 tons of rails last fall. On the score of these prospective rail purchases, local producers are looking forward to heavier mill operations during the last half of October. Specifications against old commitments have been in fair volume, with the result that books are well cleared, thus rectifying a situation which existed earlier in the year when railroads were unusually tardy in releasing

against their contracts. Inquiries by the Pere Marquette and the Great Northern are still before the trade.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, \$43; light rails, rolled from billets, \$36. Per lb.: Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.07½c. to 2.15c.; angle bars, 2.75c.

Cast Iron Pipe

The Glamorgan Pipe & Foundry Co. is low bidder at \$44.40 a ton on 1000 tons of 16-in. Class C pipe for Milwaukee. This is equivalent to \$36 a ton, Birmingham. The award, however, is being held up because earlier in the year Milwaukee purchased pipe at \$1.90 a ton below this figure. The quantities sought on both occasions were about the same, and the city officials are taking time to investigate the reasons for the higher price this fall. A contractor has entered an order for 700 tons of pipe, and several inquiries from like sources are before the trade.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$43 to \$45; 4-in., \$46 to \$48; Class A and gas pipe, \$3 extra.

Sheets

Both new buying and specifications continue to make headway, with the result that hot mill operations have been advanced to 60 or 65 per cent of capacity. This is the best showing made by local producers in several months. Even roofing has come back to life, though sellers had about given up hope that a fall increase would occur. Distribution is wider by warehouses, and many manufacturers are rounding out depleted stocks and taking added quantities for immediate use. Mills are able to supply much roofing from stock. Other grades of sheets may be entered for prompt rolling.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.60c.; No. 24 galv., 3.15c. to 3.25c.; No. 10 blue ann'd, 2.15c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Reinforcing Bars

The burden of sustaining tonnage in this market still rests on road building activities. Fresh inquiries, except for lots of less than 100 tons each, are disappointing to the trade, and word from architects lends no encouragement for the fall months. Shop operations are suffering under conditions of this kind and, odd as it may seem, dealers are experiencing delays in shipments on small tonnages which they have not been able to put through shops on schedule. This clearly indicates that shop personnel has been cut to the bone, giving little or no leeway to afford flexibility in meeting emergencies. The situation is so acute as to large tonnages that prices for billet bars for building purposes have dropped to 1.75c. a lb. out of warehouse.

Bars

Specifications for mild steel bars again show a gain, this being the second consecutive week in which users'

needs have expanded. In fact, shipments in September are fully 20 per cent heavier than in the preceding month, and inquiries now at hand foretell further expansion in October. Interest in fourth quarter requirements is growing and sellers are well encouraged in view of a number of large inquiries. Several agricultural machinery manufacturers are now taking inventory because they are about to close the fiscal year. Releases of steel for export orders of tractors are in fair volume, but the use of steel for products to be placed on the domestic market is dragging. Road machinery builders continue to specify regularly and in good volume.

The iron bar market is quiet, with the price at 1.70c. a lb. Demand for alloy steel bars is making slow headway in spite of dullness in automobile plants. Output of alloy bar mills in this district averages 50 per cent of capacity, which is a slight gain over production a week ago. Both inquiries and sales of rail steel bars are making slow headway. Few users are willing to make commitments for the future, with the result that orders are being entered for immediate shipment.

Bolts, Nuts and Rivets

A better tone rules in this market because of the fact that several manufacturers of agricultural machinery have entered larger specifications and several others are talking more encouragingly about the prospects of swinging into production about Nov. 1 on equipment which must be ready for shipment in the spring.

Coke

Shipments of by-product foundry coke are keeping pace with the gradual growth in melt of pig iron. The price remains steady at \$8 a ton, f.o.b. local ovens.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes.....	3.00c.
Soft steel bars.....	2.90c.
Reinforce'g bars, billet steel—	
Less than 5 tons.....	2.85c.
5 tons to 30 tons.....	2.45c.
30 tons to 200 tons.....	2.00c.
200 tons and over.....	1.75c.
Rail steel reinforcement—	
Less than 5 tons.....	2.50c.
5 tons to 30 tons.....	2.10c.
30 tons and over.....	1.50c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.35c.
Flats and squares.....	3.85c.
Bands (¾ in. in Nos. 10 and 12 gages).....	3.10c.
Hoops (No. 14 gage and lighter).....	3.65c.
Black sheets (No. 24).....	3.80c.
Galv. sheets (No. 24).....	4.35c.
Blue ann'd sheets (No. 10).....	3.35c.
Spikes (¾ in. and larger).....	3.55c.
Track bolts.....	4.55c.
Rivets, structural.....	4.00c.
Rivets, boiler.....	4.00c.
Per Cent Off List	
Machine bolts.....	60 and 10
Carriage bolts.....	60 and 10
Coach or lag screws.....	60 and 10
Hot-pressed nuts, sq., tap, or blank, 60 and 10	
Hot-pressed nuts, hex., tap, or blank, 60 and 10	
No. 8 black ann'd wire, per 100 lb.....	\$3.45
Com. wire nails, base per keg.....	\$2.30 to 2.55
Cement c'd nails, base per keg.....	2.30 to 2.55

Ferroalloys

Shipments remain in moderate volume, with little tendency to increase. The market is very quiet as to spot sales. No word has reached this district as to the course to be taken by producers in the matter of contracts for the coming year.

Old Material

Local steel mills continue to take scrap at the increased schedule put into effect a week ago. In the meantime, heavy melting steel is moving in small lots at \$12.50 a gross ton, delivered. Other heavy tonnage grades are quiet, largely for the reason that the supply of heavy melting steel is rather free and producers do not need to turn to other grades to speed production.

Railroad offerings are heavy this week and, in view of the lack of demand by consuming interests, dealers are hopeful of being able to buy this scrap at prices below the level recently paid to the railroads. Several automobile body builders are offering larger tonnages of hydraulic sheets. The market for this grade is dull, and consumers have not taken more than 400 or 500 tons.

Prices deliv'd Chicago district consumers: Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel.....	\$12.50 to \$13.00
Shoveling steel.....	12.50 to 13.00
Frogs, switches and guards, cut apart, and misc. rails	13.00 to 13.50
Hydraul. compressed sheets	10.25 to 10.75
Drop forge flashings.....	8.60 to 9.00
No. 1 busheling.....	9.50 to 10.00
Forg'd cast and r'l'd steel carwheels.....	15.00 to 15.50
Railroad tires, charg. box size.....	15.50 to 16.00
Railroad leaf springs cut apart.....	15.50 to 16.00
Acid Open-Hearth Grades:	
Steel couplers and knuckles	13.50 to 14.00
Coil springs.....	16.00 to 16.50
Electric Furnace Grades:	
Axle turnings.....	11.25 to 11.75
Low phos. punchings.....	6.75 to 7.25
Low phos. plates, 12 in. and under.....	13.00 to 13.50
Blast Furnace Grades:	
Axle turnings.....	8.00 to 8.50
Cast iron borings.....	6.75 to 7.25
Short shoveling turnings.....	7.25 to 7.75
Machine shop turnings.....	5.50 to 6.00
Rolling Mill Grades:	
Iron rails.....	13.00 to 13.50
Rerolling rails.....	14.50 to 15.00
Cupola Grades:	
Steel rails, less than 3 ft.....	14.00 to 14.50
Steel rails, less than 2 ft.....	14.75 to 15.25
Angle bars, steel.....	13.50 to 14.00
Cast iron carwheels.....	13.50 to 14.00
Malleable Grades:	
Railroad.....	13.50 to 14.00
Agricultural.....	12.50 to 12.75
Miscellaneous:	
*Relaying rails, 56 to 60 lb.....	23.00 to 25.00
*Relaying rails, 65 lb. and heav.....	26.00 to 31.00
Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars.....	12.00 to 12.50
Iron arch bars and transoms.....	13.00 to 13.50
Iron car axles.....	21.50 to 22.00
Steel car axles.....	15.00 to 15.50
No. 1 railroad wrought.....	9.75 to 10.25
No. 2 railroad wrought.....	11.00 to 11.50
No. 1 busheling.....	7.50 to 8.00
No. 2 busheling.....	6.00 to 6.50
Locomotive tires, smooth.....	14.50 to 15.00
Pipes and flues.....	8.00 to 8.50
Cupola Grades:	
No. 1 machinery cast.....	11.00 to 11.50
No. 1 railroad cast.....	10.00 to 10.50
No. 1 agricultural cast.....	9.50 to 10.00
Stove plate.....	8.50 to 9.00
Grate bars.....	8.50 to 9.00
Brake shoes.....	8.50 to 9.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

CLEVELAND

Steel Business Gaining, But at Very Slow Rate

CLEVELAND, Sept. 30.—Steel business continues to increase slightly in volume. Orders are mostly for small lots and from scattered sources. While not much interest is being shown in fourth quarter contracts, some contracts have been closed for bars, plates and shapes for the coming quarter at present prices and some consumers have secured extensions of third quarter contracts.

The market appears to have a firm tone on some products, but there is little evidence of a tendency to advance prices. The announcement of a few mills that they would advance auto body sheets to 3.60c. after Sept. 27 brought out some fourth quarter contracts. However, some of the larger consumers in the motor car field have made contracts only for October requirements, and several mills have not withdrawn the 3.50c. price.

Cleveland steel plants are operating at 50 per cent of ingot capacity, the same as a week ago. A slight increase in finishing mill operations in the northern Ohio territory is reported.

Demand for steel from the motor car industry shows no gain. Local forge shops and stamping plants are operating at recent rates. Production of motor cars in October is expected to be a little larger than in September. The Chevrolet Motor Co. has placed some forging steel for its new models, on which it is expected to get under way during the coming month. The local Fisher body plant that makes Chevrolet bodies has not yet got under production on the new design of bodies. The Ford Motor Co. is reported to have cut down on specifications for October shipment.

Pig Iron

Furnaces continue to sell iron in moderate volume, but there are no orders for large lots. The market in this immediate territory is very quiet. Recent inquiries for foundry and malleable iron for first quarter delivery have resulted in several sales at present prices for delivery through the current quarter and into or through the first quarter. However, no sales have been made for the first quarter alone. Producers find some encouragement in shipments, which increased this month over those of August. One of the leading producers has shipped 25 per cent more iron during the current month than during the previous month. Gain in shipping orders is scattered, but little, if any, of it is due to increased activity on the part of motor car foundries.

While there has been no change in prices, the market has a weak tone, and the \$16.50 quotation on foundry and malleable iron that has appeared at competitive points is now being

quite commonly quoted for delivery to some points in northern Ohio and Indiana, and there are unconfirmed reports of shading to \$16. Local foundries quote \$17 for nearby shipment and \$17.50 for local delivery. The market in Michigan remains steady, with \$18 the ruling price.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25.	\$17.50
S'th'n fdy., sil. 1.75 to 2.25.	\$17.51 to 18.01
Malleable	17.50
Ohio silvery, 8 per cent....	25.00
Basic Valley furnace....	18.50
Stand. low phos., Valley...	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

Bars, Plates and Shapes

Orders continue to gain a little from week to week. The improvement is more noticeable in the demand for structural material and plates than for bars. Some fourth quarter contracts have been placed for bars, plates and shapes at the current price of 1.60c., Pittsburgh, for the three products and 1.60c., Cleveland base, for steel bars for outside shipment and 1.65c. for local delivery. Some unfilled third quarter contracts carrying the recent prices have been extended into or through the fourth quarter. Orders for light plates for motor car frames made possible the starting up of a local plate mill during the week. A Lake shipyard has placed 680 tons of plates for tank tops for two Lake boats. The Biggs Boiler Works Co., Akron, was low bidder for a Detroit water pipe line requiring 500 tons of plates. The Pure Oil Co. tanks for Toledo, requiring 1650 tons, are reported to have been divided between two makers.

Wire Products

Nails continue weak in some sections of Ohio, where prices as low as \$1.90 a keg are reported. Locally, the price is holding to \$2. Manufacturers' wire is firm at 2.30c.

Sheets

Mills are getting quite a few small orders, mostly from outside of the motor car industry, and nearly all mills report a slight gain in business. Some have received orders from the Detroit territory that enabled them to increase operations this week. Manufacturers of steel furniture and partitions and other building material are operating at a fair rate, but business with most other consumers shows few signs of revival. Efforts to place black sheets on a 2.45c. Pittsburgh basis for the fourth quarter appear to have been successful, although some consumers have been able to have unfilled third quarter tonnage placed at 2.35c. carried over to the last quarter. Attempts to advance

auto body sheets to 3.60c. so far have been unsuccessful. While some mills withdrew the 3.50c. price Sept. 27, after closing fourth quarter contracts with their regular customers at that price, others are still naming 3.50c. One mill has marked up metal furniture sheets to 3.70c. However, this grade can still be bought at 3.60c. Galvanized sheets are still available at 3c.

Strip Steel

Demand for both hot and cold-rolled strip continues to drag. Few consumers have placed fourth quarter contracts. The regular quotations of 1.65c. for wide strip and 1.75c. for narrow appear to apply mostly to miscellaneous customers, as consumers in the motor car fields are able to buy at \$1 a ton less. Cold-rolled strip is weak in that less-than-carload orders have been taken at 2.35c., Cleveland, which is the prevailing price for larger lots.

Coke

Ohio by-product foundry coke has been reestablished at \$7.75, ovens, for October shipment. Foundry grades are still moving slow. A moderate amount of activity has developed in by-product coke for domestic use, which is unchanged at \$4.50, ovens.

Old Material

Local mills continue to take scrap in limited quantities against contracts. There is no new consumer demand and not much activity among dealers. Transactions in steel-making and blast furnace grades are at quoted prices. Cast scrap is lower and negative. Some heavy melting steel scrap is being sold to Youngstown dealers at \$14.25, although two mills in that district are holding up shipments.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel...	\$11.75 to \$12.25
No. 2 heavy melting steel...	11.25 to 11.50
Compressed sheet steel...	11.50 to 12.00
Light bundled sheet stampings	9.00 to 9.25
Drop forge flashings.....	10.00 to 10.50
Machine shop turnings....	7.00 to 7.50
Short shoveling turnings...	8.00 to 8.50
No. 1 railroad wrought...	13.00 to 13.50
No. 2 railroad wrought...	14.00 to 14.50
No. 1 busheling.....	11.75 to 12.00
Pipes and flues.....	9.00 to 9.50
Steel axle turnings.....	12.50 to 13.00
Acid Open-Hearth Grades:	
Low phos., billet bloom and slab crops.....	17.50 to 18.00
Blast Furnace Grades:	
Cast iron borings	8.00 to 8.50
Mixed borings and short turnings	8.00 to 8.50
No. 2 busheling	7.50 to 8.00
Cupola Grades:	
No. 1 cast	13.00 to 13.50
Railroad grate bars.....	11.00 to 12.00
Stove plate	12.00 to 12.50
Rails under 3 ft.	18.50 to 19.50
Miscellaneous:	
Rails for rolling.....	16.25 to 16.50
Railroad malleable	15.00 to 15.50

NEW YORK

Prices of Pig Iron Lower—Steel Improvement Small

NEW YORK, Sept. 30.—With the expansion of pig iron demand, and particularly the appearance of large individual inquiries, price competition has grown sharper. Buffalo foundry iron has been offered at \$15.50 base, furnace, a concession of 50c. a ton, while \$11.50, Birmingham, is a now rather common quotation on Alabama iron, with as low as \$11 reported named in some instances.

In northern New Jersey barge iron for shipment from Buffalo is reported to have been quoted at \$18.50, delivered. The rail rate from Jersey City is \$1.26 and the transfer, handling and storage charge is 40c., leaving a net of \$16.84, f.o.b. barge. Assuming the price at furnace is \$15.50, the allowance for barge transportation is \$1.34. On Southern iron the lowest combination rail and barge rate from Birmingham via Norfolk is understood to be \$4.85 a ton. On the basis of a quotation of \$11.50, Birmingham, this would make the price \$16.35 in New York harbor. To this must be added 20c. a ton for transfer to cars and the railroad freight rate to destination. However, this rail and water rate applies only to large shipments coming in ocean-going barges. Lots of as small as 200 tons each are handled by steamship from Savannah at a combination rate of \$5.50, which includes transfer to cars at New York dock.

Sales in this district, at 12,000 tons, compare with a total of 9000 tons in the previous week. The largest individual purchase was by the General Electric Co., which closed for 5000 tons.

Prices per gross ton, delivered New York district:
Buffalo No. 2 fdy., sil. 1.75 to 2.25 \$20.41 to \$20.91
*Buff. No. 2, del'd east.
N. J. 18.78 to 19.28
East. Pa. No. 2 fdy., sil. 1.75 to 2.25 18.89 to 19.39
East. Pa. No. 2X fdy., sil. 2.25 to 2.75 18.89 to 19.89

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.
*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

Warehouse Business

September business with most jobbers shows little or no improvement over that of August, the usual increase in buying after the summer season having failed to develop. Sheet prices continue to be subject to concessions, especially on galvanized sheets. Structural steel buying is limited to small lots, with users able to secure prompt delivery from the mills, even when small tonnages are required.

Cast Iron Pipe

Operating rates of Northern foundries are slightly reduced from the 70 per cent average, which has been maintained for some months. Buying

by public utilities and municipalities is limited generally to carload lots of pipe, and the usual fall buying has not developed. With a number of municipalities preparing bond issues, however, producers expect some fair business to appear later in the fall. Quotations are maintained at \$36 to \$37 a net ton, f.o.b. Northern foundry, despite the lack of substantial buying.

Prices per net ton deliv'd New York:
Water pipe, 6-in. and larger, \$38.90 to \$39.90; 4-in. and 5-in., \$41.90 to \$42.90; 3-in., \$48.90 to \$49.90. Class A and gas pipe, \$3 extra.

Finished Steel

Signs of improvement in steel business are hard to find. While there have been gains in orders for some products, the change is not impressive. Efforts of steel mills to stiffen prices for the fourth quarter have at least given a good many buyers the impression that quotations are "on bottom," but interest in making fourth quarter commitments is not widespread because users of steel are still uncertain as to what their requirements may be through the entire quarter.

There is some doubt as to the success of the sheet manufacturers in trying to establish minimum prices of 2.45c. for black sheets, 2c. for No. 10 blue annealed and 2.15c. for No. 13 blue annealed. There have been very

few tests of these prices. Reports from other districts intimate that black and blue annealed sheet prices are not as firm as some producers would like them to be. Galvanized sheets are being sold at 3c., Pittsburgh, to jobbers and large consumers. Only small buyers are paying higher than 3c.

Structural steel awards in the New York district are not particularly large. An inquiry for about 25,000 tons of fabricated steel for the third section of the West Side elevated highway is expected within two weeks.

Reinforcing Bars

Owing to the placing of three large projects, total awards in this territory are unusually heavy, aggregating 7800 tons. Revised quotations of leading bar distributors, effective Oct. 1, are: For mill shipment, 1.70c. a lb., Pittsburgh, on building and paving work, and 1.80c. on subway work (rail steel to be offered at \$4 a ton less); for delivery from local stock, 2.35c. a lb., New York, up to 3.05c. a lb. for lots of less than two tons.

Old Material

All grades of scrap lack strength, with consumers showing no interest in buying. No. 1 heavy melting steel is quoted by brokers filling contracts at \$12.50 a ton, delivered eastern Pennsylvania, and shipments are going to a consumer at Coatesville, Pa. A mill at Claymont, Del., which has had deliveries of heavy melting steel suspended for some months, is reported to have resumed shipments temporarily. Brokers buying for barge shipment of No. 1 steel to Buffalo users are obtaining most of the tonnage required at \$10 to \$10.25 a ton, on barge, New York, instead of \$10.50, the recent buying price.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel..	\$9.00 to \$10.25
Heavy melting steel (yard)	5.75 to 6.25
No. 1 hvy. breakable cast..	8.00 to 9.00
Stove plate (steel works)..	6.00 to 6.25
Locomotive grate bars....	6.00 to 6.50
Machine shop turnings....	5.00 to 5.25
Short shoveling turnings..	6.00 to 5.50
Cast borings (blast fur. or steel works)	4.50 to 4.75
Mixed borings and turnings	4.50 to 5.00
Steel car axles.....	17.00
Iron car axles.....	19.00 to 19.50
Iron and steel pipe (1 in. dia., not under 2 ft. long)	7.50 to 8.00
Forge fire	7.00 to 7.50
No. 1 railroad wrought...	9.75
No. 1 yard wrought, long..	8.75
Rails for rolling.....	9.50 to 10.00
Stove plate (foundry)....	7.00
Malleable cast (railroad)..	10.50 to 11.00
Cast borings (chemical)...	8.50 to 9.00

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast.....	\$14.00
No. 1 hvy. cast (columns, bldg. materials, etc.); cupola size.....	12.00
No. 2 cast (radiators, cast boilers, etc.)	11.50

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes.....	3.10c.
Soft steel bars, small shapes.....	3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal...7.00c. to 7.25c.	
Cold-fin. shafting and screw stock—	
Rounds and hexagons.....	3.40c.
Flats and squares.....	3.90c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Blue ann'd sheets (No. 10).....	3.25c. to 3.40c.
Black sheets (No. 24*).....	3.65c. to 3.90c.
Galvanized sheets (No. 24*).....	4.25c.
Long terme sheets (No. 24).....	5.80c.
Standard tool steel.....	12.00c.
Wire, black annealed.....	4.50c.
Wire, galv. annealed.....	5.15c.
Tire steel, ½ x ½ in. and larger... 3.40c.	
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open-hearth spring steel, bases,	4.50c. to 7.00c.

*No 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller.....	65
1 x 30 in. and smaller.....	65
Carriage bolts, cut thread:	
¾ x 6 in. and smaller.....	65
¾ x 20 in. and smaller.....	65
Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.....	\$19.00
Seamless steel, 2-in.....	20.25
Charcoal iron, 2-in.....	26.25
Charcoal iron, 4-in.....	67.00

PHILADELPHIA

Basic and Foundry Iron Lower— Steel Operations Unchanged

PHILADELPHIA, Sept. 30.—Business on steel mill books has not increased sufficiently to justify an increase in operating rates, which continue at about 50 per cent of capacity in the rolling departments, except for the leading independent, which is doing somewhat better. Steel consumers show more inclination to cover their requirements for a few weeks ahead and are not pressing for concessions as they did recently. While demand for pig iron is improved, the price of foundry grade lacks strength as a result of a further reduction in the price of Southern iron, and basic is off 50c. a ton.

Steel prices are still subject to small concessions on desirable business, despite efforts by mills to develop a firm market. Plate mills have some substantial tonnage in prospect, including four ships for the Grace Line, expected to be awarded in the next fortnight to the New York Shipbuilding Corporation. In the past week an oil company outside this district has closed on a total of 5000 tons of plates for delivery to the end of the year.

Steel Bars

Prices of merchant steel bars continue at 1.60c. to 1.65c. a lb., Pittsburgh, or 1.89c. to 1.94c. per lb., delivered Philadelphia. The lower price applies on most orders of a carload or more. Reinforcing bars are 1.75c. to 1.85c., Pittsburgh, or 2.04c. to 2.14c., delivered Philadelphia, for billet steel bars, and rail steel bars range from 1.55c. to 1.65c., Franklin, Pa., or 1.84c. to 1.94c., delivered Philadelphia. Most of the current reinforced concrete projects require less than 100 tons of bars each, except for occasional work, such as four barracks for the United States Marine Corps at Quantico, Va., calling for 800 tons.

Pig Iron

Quotations on eastern Pennsylvania foundry iron range from \$18 to \$18.50 a ton, furnace, with Southern iron offered at \$11.50 to \$12 a ton, Birmingham, or \$16.75 to \$17.25, on cars, Philadelphia, in small lots. Competition from Southern pig iron has again become a serious factor in eastern Pennsylvania, and furnace interests have applied to the Interstate Commerce Commission to have the present combination rail and water freight rates from Birmingham to Atlantic ports rescinded. Inquiry for pig iron is improving, many consumers apparently being satisfied that present prices are at a level offering advantages in forward buying. The Baldwin Locomotive Works is about to close on 2000 tons of floor and cylinder iron for first quarter delivery. Basic iron is more active. The Claymont, Del., consumer has bought about 3000 tons and will close on an additional 2000 to 3000 tons. The Standard Steel Works

Co. is inquiring for about 3000 tons of basic iron and a tonnage of low phosphorus. Recent quotations on basic show a market range of \$17.75 to \$18.25 a ton, delivered.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil	\$18.76 to \$19.26
East. Pa. No. 2X, 2.25 to 2.75 sil	19.26 to 19.76
East. Pa. No. 1X	19.76 to 20.26
Basic (del'd east. Pa.)	17.75 to 18.25
Malleable	21.25
Stand. low phos. (f.o.b. east. Pa. furnace)	24.00
Cop. b'r'g low phos. (f.o.b. furnace)	23.00 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil	22.29
Va. No. 2X, 2.25 to 2.75 sil	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Shapes

Quotations on new business are generally 1.70c. a lb., f.o.b. nearest mill to consumer, or 1.76c., delivered Philadelphia. Much of the tonnage being entered on mill books, however, is at prices \$1 to \$2 a ton lower, as consumers are covering on protections, which have not been withdrawn. Fabricators are quoting on a number of new building projects, including a 400-ton garage at Pottsville, Pa., a 2500-ton building for the Girard Trust Co. in Philadelphia and two bridges for Philadelphia, requiring a total of 500 to 600 tons.

Plates

Mills are generally quoting 1.70c. a lb., Coatesville, Pa., or 1.80½c., delivered Philadelphia, except on large plate contracts, when concessions are usually granted. Operating rates of eastern Pennsylvania mills are generally unchanged at 50 per cent of capacity in their rolling departments, with slightly lower rates of ingot production. With some buying by oil companies, and a substantial tonnage in prospect for shipbuilding, mills are inclined to maintain a firm attitude in maintaining the present price level.

Sheets

Sheet consumers in this district continue moderately active, and there

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.60c.
Structural shapes	2.60c.
Soft steel bars, small shapes, iron bars (except bands)	2.70c.
Reinforc. steel bars, sq., twisted and deform.	2.60c. to 2.70c.
Cold-fin. steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.25c.
Steel bands, No. 12 to ¼-in. inclus.	3.00c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.70c.
†Galvanized sheets (No. 24)	4.25c.
Light plates, blue annealed (No. 10)	3.15c.
Blue ann'd sheets (No. 13)	3.30c.
Diam. pat. floor plates, ¼-in.	5.30c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

is a slight improvement in the number of orders. One eastern Pennsylvania interest is operating its sheet mills at 75 to 80 per cent of capacity. The Claymont, Del., plate producer, which is installing a blue annealed mill, expects to roll its first sheets next week. Blue annealed sheets are quoted at 2.15c., Pittsburgh, or 2.44c., delivered Philadelphia, for No. 13 gage, and blue annealed plates are 2c., Pittsburgh, or 2.29c., delivered Philadelphia, for No. 10 gage. Black sheets are fairly firm at 2.45c., Pittsburgh, or 2.74c., Philadelphia, with a base price \$1 lower occasionally used in adding the extras for full finished sheets. Demand for galvanized sheets has been rather small recently, as most consumers are fairly well covered. With buying light, prices have rather generally settled to 3c., Pittsburgh, or 3.29c., Philadelphia, 3.05c., Pittsburgh, or 3.34c., Philadelphia, applying only on small lots.

Imports

In the week ended Sept. 27 a total of 2651 tons of pig iron was received at this port from British India, 2000 tons of chrome ore from Portuguese Africa, 817 tons of scrap iron from Cuba and 21 tons of iron bars from Sweden.

Old Material

Prices of all grades of scrap except No. 1 heavy melting steel are showing increasing unsteadiness in a quiet market. A consumer of heavy breakable cast at Florence, N. J., following a purchase at \$12.50 a ton, delivered, is offering \$12. Cast borings are off slightly, following sales at \$8.75 and \$8.50, delivered. No. 1 and No. 2 heavy melting steel are inactive as most eastern Pennsylvania consumers have a substantial tonnage still due on old contracts.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	\$13.00
No. 2 heavy melting steel	\$10.50 to 11.00
Heavy melting steel (yard)	10.00
No. 1 railroad wrought	14.75 to 15.00
Bundled sheets (for steel works)	9.50
Hydraulic compressed, new	11.00 to 11.50
Hydraulic compressed, old	9.50
Machine shop turnings (for steel works)	9.00
Heavy axle turnings (or equiv.)	11.50 to 12.00
Cast borings (for steel works and roll. mill)	8.50 to 8.75
Heavy breakable cast (for steel works)	11.50 to 12.00
Railroad grate bars	10.00
Stove plate (for steel works)	10.00
No. 1 low phos., hvy., 0.04% and under	20.00
Couplers and knuckles	17.50 to 18.00
Rolled steel wheels	17.50 to 18.00
No. 1 blast f'nace scrap	8.00 to 8.50
Wrot iron and soft steel pipes and tubes (new specific.)	12.00 to 12.50
Shafting	18.00 to 18.50
Steel axles	20.50 to 21.00
No. 1 forge fire	11.00 to 11.50
Cast iron carwheels	15.00
No. 1 cast	13.00 to 13.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rails for rolling	13.50 to 14.00

BIRMINGHAM

Pig Iron Melters Still Buying Hand to Mouth—Steel Prices Lower

BIRMINGHAM, Sept. 30.—A limited number of the smaller melters have covered their fourth quarter pig iron requirements. The larger buyers have not covered, and the total tonnage under contract is but a small part of the probable make for the quarter. Several important melters carry as little as one or two cars of iron in stock, frequently requesting shipments within two days of order date. A decline in shipments during the past 10 days is attributed to a policy of some foundries, including pipe shops, to reduce inventories by Oct. 1. There is no evidence of any particular change in the melt and shipments are expected to take on more activity this week. Inquiries are scarce. District sales take the price of \$14, base Birmingham. Ten furnaces are active, the same as last week. Of this number, nine are on foundry iron and the other on basic iron. The Tennessee company, the largest producer of basic iron in the district, is operating only two furnaces and one of these is on foundry iron.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.....	\$14.00
No. 1 fdy., 2.25 to 2.75 sil.....	14.50
Basic	14.00

Finished Steel

Inquiries for bars, plates, sheets and shapes show a gain. Sales held their own last week. Quotations on structural shapes and tank plates have been reduced \$1 a ton to 1.80c. to 1.85c. a lb. Quotations on black sheets are off \$1 a ton, new prices being 2.60c. to 2.65c., and galvanized are also \$1 a ton lower at 3.15c.

The Tennessee company is operating five of eight open-hearths at Fairfield and the Gulf States Steel Co. three of six at Alabama City, making a total of eight active furnaces of 23 in the district. All nine open-hearths at Ensley are idle.

Demand for fabricated structural steel is holding its own. The Virginia Bridge & Iron Co. is low bidder on several hundred tons for Kentucky State highway bridge work. The Southern Steel Works Co. has booked 200 tons for an addition to the Crane Co.'s foundry and pattern shop at Birmingham and 100 tons for the Singer Sewing Machine Co. at New Orleans.

Cast Iron Pipe

The market for pressure pipe is better in some sections than others, but on the whole the demand is holding up fairly well and bookings are averaging close to those of a year ago. Effects of the recent drought have brought out some new work, and a few buyers are beginning work on delayed construction programs in order to relieve unemployment. Government work in the Panama Canal Zone has resulted in the placing of some important pipe orders here.

Marrero, La., is in the market for

upward of 1500 tons, for which bids will be opened Oct. 30. A tonnage equally as large will be required for the project at Lebanon, Tenn., for which bids are to be taken in about 30 days. Columbia, Ky., is to open bids this week for several hundred tons, and Clarksville, Tenn., will open bids Sept. 30 on approximately 350 tons. Hazlehurst, Miss., will open bids Oct. 7 on 5256 ft. of 4-in. pipe, and Lamar, Mo., will open bids on the same date for 1545 ft. of 8-in. pipe. The American Cast Iron Pipe Co. and the National Cast Iron Pipe Co. have received contracts from Los Angeles for 637 tons and 363 tons respectively.

Coke

Shipments of foundry coke have been steady, but lighter than for any other September in years. Merchant producers are maintaining steady op-

erations as to the number of ovens, but owing to slow coking operations the output is lower than usual. There are 791 active ovens, leaving 420 on the idle list.

Old Material

The market was generally quiet last week, showing less activity than four weeks ago. This is due mainly to a lighter demand for steel scrap. Steel mills have light stocks for this season, and, with one exception, dealer stocks are scanty. Even so much as a normal demand would bring out a shortage in several lines.

Prices per gross ton deliv'd Birmingham dist. consumers' yards:

Heavy melting steel.....	\$12.00
Scrap steel rails.....	\$12.50 to 13.00
Short shoveling turnings..	9.00
Cast iron borings.....	9.00
Stove plate	10.00
Steel axles	21.00
Iron axles	23.00
No. 1 railroad wrought... 10.00 to	10.50
Rails for rolling.....	13.50
No. 1 cast.....	11.50
Tramcar wheels.....	11.50
Cast iron carwheels.....	12.00
Cast iron borings, chem....	13.50

CINCINNATI

Pig Iron Demand Gains Slightly—Improvement in Sheet Orders

CINCINNATI, Sept. 30.—Demand for pig iron improved last week. Furnace representatives report total sales of about 3400 tons, an increase of 800 tons over the preceding week. The outstanding order called for 1000 tons of Southern foundry iron, to be delivered in the next 90 days to a southern Ohio consumer. Two Cincinnati consumers have bought 200 tons and 150 tons of Northern iron, respectively, while a Dayton, Ohio, buyer took 150 tons and a northern Indiana melter closed for 200 tons.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	\$20.89 to \$21.39
Ala. fdy., sil. 1.75 to 2.25 ..	15.19 to 16.19
Ala. fdy., sil. 2.25 to 2.75 ..	15.69 to 16.69
Tenn. fdy., sil. 1.75 to 2.25 ..	15.19 to 16.19
S'th'n Ohio silvery, 8 per cent	24.39

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
New billet reinforce. bars.....	3.15c.
Rail steel reinforce. bars.....	3.00c.
Hoops	3.90c.
Bands	3.35c.
Cold-fin. rounds and hex.....	3.80c.
Squares	4.30c.
Black sheets (No. 24).....	4.05c.
Galvanized sheets (No. 24).....	4.90c.
Blue ann'd sheets (No. 10).....	3.45c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'd wire, per 100 lb. (25	\$3.00
Com. wire nails, base per keg (25	kegs or more)..... 2.95
Cement c't'd nails, base 100 lb. keg	2.95
Chain, per 100 lb.....	10.25

	Net per 100 Ft.
Lap-welded steel boiler tubes, 2-in..	\$16.50
4-in.	34.50
Seamless steel boiler tubes, 2-in....	17.50
4-in.	36.00

Finished Steel

The uptrend in demand for sheets continues to feature the district market. The leading interest reports heavier bookings, continuing the upswing which began about three weeks ago. Accordingly, production schedules are a trifle higher. In one unit the leading independent reports 100 per cent operation for this week as a result of the increase in bookings.

Old Material

While district mills are operating at slightly improved rates, they are not specifying or buying scrap. Shipments on most of the contracts have been suspended for indefinite periods, and virtually no new business is being closed. Dealers are bidding conservatively and are carefully watching the trend of the market.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$11.00 to \$11.50
Scrap rails for melting....	12.00 to 12.50
Loose sheet clippings.....	7.00 to 7.50
Bundled sheets	9.50 to 10.00
Cast iron borings.....	6.50 to 7.00
Machine shop turnings....	6.00 to 6.50
No. 1 busheling.....	9.25 to 9.75
No. 2 busheling.....	6.00 to 6.50
Rails for rolling.....	13.00 to 13.50
No. 1 locomotive tires....	13.25 to 13.75
No. 2 railroad wrought... 11.00 to	11.50
Short rails	16.00 to 16.50
Cast iron carwheels.....	12.00 to 12.50
No. 1 machinery cast.....	14.50 to 15.00
No. 1 railroad cast.....	12.50 to 13.00
Burnt cast	7.00 to 7.50
Stove plate	7.00 to 7.50
Brake shoes	7.00 to 7.50
Agricultural malleable	12.50 to 13.00
Railroad malleable	13.50 to 14.00

August shipments of enameled sanitary ware totaled 200,231 pieces, compared with 207,600 pieces in July, according to reports received by the Department of Commerce.

BOSTON Buffalo Pig Iron Breaks Below \$20 a Ton, Delivered—Some Scrap Prices Easier

BOSTON, Sept. 30.—Buffalo No. 2 plain and No. 2X irons have dropped below \$20 a ton, delivered in New England, one furnace having accepted and is offering those grades at \$15.50 a ton, on cars, Buffalo, which, with a \$4.28 a ton rail and water freight, brings the delivered price down to \$19.78 a ton. Other Buffalo furnaces have held to \$16 a ton, Buffalo, but furnaces east of Buffalo are meeting the \$15.50 Buffalo price, or slightly shading it, and are securing the bulk of current business. Alabama iron representatives also have reduced their price to \$11.50 a ton, furnace, but to date have not figured prominently in sales, the largest consumers of such iron having ample supplies for the remainder of 1930. Total sales the past week were slightly under 3500 tons. The Rhode Island Malleable Iron Co. is in the market for 1000 tons of malleable, and the Eastern Malleable Iron Co., Naugatuck, Conn., has yet to cover on its 2500-ton inquiry.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25..	\$19.78 to \$20.28
*Buffalo, sil. 2.25 to 2.75..	19.78 to 20.28
*Buffalo, sil. 1.75 to 2.25..	20.41 to 20.91
*Buffalo, sil. 2.25 to 2.75..	20.91 to 21.41
Val., sil. 1.75 to 2.25.....	25.21
Val., sil. 2.25 to 2.75.....	25.71
*Ala., sil. 1.75 to 2.25.....	21.11
*Ala., sil. 2.25 to 2.75.....	21.61
*Ala., sil. 1.75 to 2.25.....	17.25
*Ala., sil. 2.25 to 2.75.....	17.75

Freight rates: \$4.91 all rail and \$4.28 rail and water from Buffalo; \$5.21 all rail from Virginia; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

Reinforcing Steel

Business continues quiet, sales the past week not exceeding 500 tons. Prices are unchanged, as follows: Billet steel bars in one to five ton lots, 3.15c. a lb. from stock; six to 99-ton lots, 2.65c.; 100-ton lots and larger,

2.55c. Rail steel bars, 2.26½c. a lb., delivered common Boston freight rate points.

Cast Iron Pipe

The only important tonnage sold the past week was 150 tons of 8-in. pipe to Fort Fairfield, Me., by the Donaldson Iron Co. All bids for 115 tons of 18-in. pipe and special fittings required by the Onset, Mass., fire district have been rejected. R. D. Wood & Co. were the low bidders on this tonnage. Quite a few car lots of pipe are moving from day to day, but anticipated large tonnages are slow in developing. Class B pipe is generally quoted at or close to \$36 a ton, on cars foundry, but in some instances \$37 is obtained. A \$3 differential is asked on Class A and gas pipe.

Track Supplies

The Boston & Albany Railroad has placed 1900 tons of tie plates with Jones & Laughlin Steel Corp.

Old Material

Heavy melting steel is 25c. to 50c. a ton lower than a week ago, and steel mill borings are off 40c., while in-

creased offerings of No. 1 machinery cast and a limited demand have forced prices off 50c. to \$1. Comparatively little scrap is being purchased for Pennsylvania delivery, and only limited tonnages of long bundled skeleton for the American Steel & Wire Co., Worcester, Mass. A Portland, Me., rolling mill is taking some axles, but otherwise business is virtually at a standstill. Stocks in dealers' yards are not increasing to any marked degree, as owners of scrap are selling at current prices only when necessity demands some ready cash.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel..	\$8.50 to \$9.00
Scrap T rails.....	8.50 to 9.00
Scrap girder rails.....	7.50 to 8.25
No. 1 railroad wrought....	8.00 to 8.50
Machine shop turnings....	3.75 to 4.10
Cast iron borings (steel works and rolling mill)	3.10 to 3.60
Bundled skeleton, long....	6.10 to 6.60
Forge flashings.....	7.25 to 7.75
Blast furnace borings and turnings.....	3.10 to 3.50
Forge scrap.....	6.10 to 6.60
Shafting.....	13.00 to 14.00
Steel car axles.....	16.50 to 17.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	7.00 to 7.25
Rails for rolling.....	10.00 to 10.25
Cast iron borings, chemical	9.00 to 9.50

Prices per gross ton deliv'd consumers' yards:

Textile cast.....	\$11.00 to \$11.50
No. 1 machinery cast....	12.50 to 13.50
No. 2 machinery cast....	10.50 to 11.50
Stove plate.....	8.00
Railroad malleable.....	14.00 to 14.50

PACIFIC COAST Demand for Reinforcing Bars and Structural Steel Fairly Steady

SAN FRANCISCO, Sept. 27.—(By Air Mail.)—Although both sales and inquiries were not especially large this week, a somewhat better undertone is noted, and prices are being well maintained. The outstanding award was 470 tons of H columns for the Honolulu Oil Company, San Francisco, placed with the Pacific Coast Steel Corp.

Pig iron prices per gross ton at San Francisco:

*Utah basic.....	\$22.00 to \$24.00
*Utah fdy., sil. 2.75 to 3.25.....	22.00 to 24.00
**Indian fdy., sil. 2.75 to 3.25.....	22.00 to 24.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

tween 2.15c. and 2.25c., c.i.f. coast ports.

Shapes

Several new projects involving fair-sized lots of structural shapes are up for figures. Among these are 2400 tons for the new Mills Building, San Francisco, bids on which will be opened Oct. 9. Awards included 125 tons for a school auditorium in Long Beach, booked by the Pacific Iron & Steel Co., 270 tons for an apartment house on Vallejo Street, San Francisco, secured by McClintic-Marshall Co., and 176 tons for a rock crushing plant at Livermore, Cal., awarded to the Western Iron Works. Plain ma-

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates.....	3.365c.
Structural shapes—	
Angles and beams.....	3.365c.
Tees.....	3.365c.
Zees.....	3.365c.
Soft steel bars, small shapes.....	3.265c.
Flats, hot-rolled.....	4.15c.
Reinforcing bars.....	3.265c. to 3.54c.
Iron bars—	
Refined.....	3.265c.
Best refined.....	4.60c.
Norway rounds.....	5.60c.
Norway squares and flats.....	7.10c.
Spring steel—	
Open-hearth.....	5.00c. to 10.00c.
Crucible.....	12.00c.
Tire steel.....	4.50c. to 4.75c.
Bands.....	4.015c. to 5.00c.
Hoop steel.....	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.....	3.50c. to 5.55c.
Squares and flats.....	4.00c. to 7.05c.
Toe calk steel.....	6.00c.
Rivets, structural or boiler.....	4.50c.
Per Cent Off List	
Machine bolts.....	60 and 5
Carriage bolts.....	60 and 5
Lag screws.....	60 and 5
Hot-pressed nuts.....	60 and 5
Cold-punched nuts.....	60 and 5
Stove bolts.....	70 and 10

Bars

Demand for reinforcing steel bars is well sustained and awards this week exceeded 1000 tons. Unnamed interests took 200 tons for a hospital in San Bernardino, 100 tons for a school auditorium in Long Beach and 300 tons for a theater on South Broadway, Los Angeles. Pending business aggregates upward of 7000 tons. New inquiries include 400 tons for the Mills Building, San Francisco, and 400 tons for the Edmond Meany Hotel in Seattle. Out-of-stock prices both in the Los Angeles and San Francisco districts continue firm at 2.50c., base, on carload lots.

Plates

The Chicago Bridge & Iron Works secured an elevated steel tank and tower for Procter & Gamble Co. at Long Beach, requiring 50 tons. No definite date for bids has been set for the 10,000-ton Seattle pipe line project. Quotations continue to range be-

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes.....	3.40c.
Soft steel bars.....	3.40c.
Black sheets (No. 24).....	4.35c.
Blue ann'd sheets (No. 10).....	3.80c.
Galv. sheets (No. 24).....	5.00c.
Struc. rivets, ½-in. and larger.....	5.90c.
Com. wire nails, base per keg.....	\$3.35
Cement c'd nails, 100 lb. keg.....	3.35

terial remains unchanged at 2.15c. to 2.25c., c.i.f.

Cast Iron Pipe

The only pipe award in excess of 100 tons went to the Central Foundry Co. and called for 150 tons of Universal pipe for Spokane, Wash. C. G. Claussen & Co. were low bidders on 2022 tons of 4 to 8-in. Classes B, 150

and 250 pipe for the East Bay Municipal Utility District, Oakland, Cal. Bids were opened on 2216 tons of 4 to 12-in. Class B pipe for Long Beach and on 3008 tons of 16 to 24-in. Classes B and 150 pipe for Los Angeles. The only new inquiry of importance involves 331 tons of 6 to 12-in. Class 150 pipe for Fullerton, Cal., bids on which will be opened Oct. 7.

have been keenly sought at good prices. There was not much buying by consumers during the week. Rolling mill grades are dull. Rails and specialties are scarce. Prices are unchanged.

The St. Louis-San Francisco offers 150 carloads, the largest offering in the history of the road, according to dealers. Other lists follow: Pennsylvania, 33,955 tons; Cleveland, Cincinnati, Chicago & St. Louis, 1206 tons; Missouri-Kansas-Texas, 420 tons; International Great Northern, 400 tons; Chicago, Milwaukee, St. Paul & Pacific, 150 carloads; Missouri Pacific, 115 carloads; New York, Chicago & St. Louis, 61 carloads; Belt Railway of Chicago, 14 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel	\$11.50 to \$12.00
No. 1 heavy melting or shoveling steel	11.50
No. 2 heavy melting or shoveling steel	10.25 to 10.50
No. 1 locomotive tires	13.25 to 13.75
Misc. stand-sec. rails including frogs, switches and guards, cut apart	13.00 to 13.50
Railroad springs	14.50 to 15.00
Bundled sheets	7.00 to 7.50
No. 2 railroad wrought	11.00 to 11.50
No. 1 busheling	8.00 to 8.50
Cast iron borings and shoveling turnings	6.00 to 6.50
Iron rails	10.00 to 11.00
Rails for rolling	13.50 to 14.00
Machine shop turnings	4.50 to 5.00
Heavy turnings	9.00 to 9.50
Steel car axles	16.50 to 17.00
Iron car axles	21.00 to 21.50
Wrot. iron bars and trans.	14.00 to 14.50
No. 1 railroad wrought	9.00 to 9.50
Steel rails, less than 3 ft.	14.50 to 15.00
Steel angle bars	12.50 to 13.00
Cast iron car wheels	12.00 to 12.50
No. 1 machinery cast	11.00 to 11.50
Railroad malleable	11.50 to 12.00
No. 1 railroad cast	11.00 to 11.50
Stove plate	9.00 to 9.50
Relay. rails, 60 lb. and under	20.50 to 23.50
Relay. rails, 70 lb. and over	26.50 to 29.00
Agricult. malleable	10.00 to 10.50

ST. LOUIS Pig Iron Buyers Waiting—Railroads Issue Steel Inquiries

ST. LOUIS, Sept. 30.—The end of the third quarter finds more interest in the pig iron market than was shown three months ago, and yet buying continues light. The fact is that melters are still hesitant about commitments for the remainder of the year, and are waiting to see what the early weeks of October will bring in new business and pig iron prices. Makers expect very little buying until about Oct. 15. Great interest is being shown here in the basic situation, as the large consumers on the East Side are beginning to make up their minds as to their fourth quarter purchases. Prices are unchanged. The farm implement and stove trades have suffered from reduced purchasing power, resulting from the drought, and business is disappointing.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	\$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., deliv'd St. Louis	19.66
Southern No. 2 fdy., deliv'd	\$15.92 to 16.42
Northern malleable, deliv'd	19.16 to 19.66
Northern basic, deliv'd	19.16 to 19.66

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Finished Steel

Railroads centering in St. Louis have issued inquiries for fourth quarter requirements of plates, shapes and sheets, and mills are hopeful of some business resulting therefrom, especially as specifications against third

quarter contracts amounted to almost nothing. Warehouse business shows moderate betterment. Advance ordering of wire fencing and accessories is reported to be the smallest in recent years as a result of the effects of the drought on farm purchasing power. Structural fabricators report a fairly large volume of small orders, although large tonnages are scarce. A leading fabricator is now booked up to capacity for the remainder of the year. The only reinforcing bar award of the week, 500 tons for a St. Louis sewer, went to the Missouri Rolling Mills Corp.

Old Material

Activity in the scrap market the past week was confined to purchases by dealers to cover sales of melting steel and specialties made the preceding week. There is said to be very little distress material and not much coming from the country yards, with the result that railroad offerings

CANADA

Pig Iron Business Improving Slightly—Structural Inquiries Appearing

TORONTO, Sept. 30.—While there is no last-minute rush to cover pig iron needs for last quarter, business is showing improvement, and a number of melters have covered. Inquiries and specifications continue to appear which indicate that other consumers will place forward delivery contracts. Spot buying is also picking up. While most of the sales run to one or two car lots, sales were made for as much as 200 tons. The weekly total of new business is gradually increasing, according to local blast furnace representatives, who point out, however, that the average is about 50 per cent under that of a year ago. Local steel interests look for improvement in the industry as a result of the recent advance in tariff. Pig iron prices are unchanged.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	22.50

Rails

The Algoma Steel Corporation, Sault Ste. Marie, Ont., will resume operations at its rail mill on Oct. 10 or 15, according to a statement made by W. C. Franz, president. The company has closed a rail contract of sufficient tonnage to maintain mill operation on single shift until December, after which the mill will be shut down again for a time to permit of necessary work in connection with the installation of the new machinery.

Structural Steel

Inquiries that are appearing indicate some good tonnage contracts for early closing, both in the Toronto and Montreal districts. Business of the past few days was confined to lots under 500 tons and was spread over Ontario and Quebec.

Old Material

Dull trading characterized business in this market for the week, chiefly because of the Jewish holiday season.

Warehouse Prices, f.o.b. St. Louis

Base per Lb.	
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shafting, screw stock	3.60c.
Black sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	4.85c.
Blue ann'd sheets (No. 16)	3.45c.
Black corrug. sheets (No. 24)	4.30c.
Galv. corrug. sheets	4.90c.
Structural rivets	4.15c.
Boiler rivets	4.15c.
Per Cent Off List	
Tank rivets, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50

Sales made were mostly in small lots, although some forward delivery contracts were included. Mills continue to take delivery of heavy melting steel and turnings in small tonnages. Dealers look for early betterment in the market. Prices are unchanged.

Dealers' buying prices for old material:
Per Gross Ton

	Toronto	Montreal
Heavy melting steel.....	\$9.00	\$8.00
Rails, scrap.....	10.00	8.00
No. 1 wrought.....	9.00	11.00
Machine shop turnings.....	6.00	5.00
Boiler plate.....	7.00	6.50
Heavy axle turnings.....	7.00	6.00
Cast borings.....	6.50	5.00
Steel borings.....	6.50	6.00
Wrought pipe.....	4.00	4.00
Steel axles.....	10.00	13.00
Axles, wrought iron.....	12.00	15.00
No. 1 machinery cast.....	12.00	12.00
Stove plate.....	10.00	10.00
Standard carwheels.....	10.50	10.50
Malleable.....	10.00	10.00
Per Net Ton		
No. 1 mach'ry cast.....	11.00	....
Stove plate.....	9.00	....
Standard carwheels.....	10.00	....
Malleable scrap.....	9.00	....

Youngstown

Youngstown Valley Mill Operations Erratic

YOUNGSTOWN, Sept. 30.—The Falcon plant at Niles of the Empire Steel Corpn. resumed operations this week, with 13 mills running. The Republic Steel Corpn. states it is able to maintain average schedules at 65 per cent, while Newton Steel Co. is operating its Newton Falls works in Ohio at 50 per cent on releases from the automobile industry.

Newton has omitted its third quarter cash dividend on common stock, however, heretofore paid this year at the rate of 50c. a share quarterly. The company will pay on Oct. 31 the usual quarterly dividend of \$1.50 a share on its preferred stock to holders of record Oct. 15.

Officials says that negotiations are being continued for a merger with the Corrigan-McKinney Steel Co., Cleveland.

This week the Sharon Steel Hoop Co. blows out its blast furnace at Lowellville, Mahoning County, for relining and repairs. The stack will resume immediately upon the completion of this work. Sharon Steel also suspends its sheet mills for the week. The company has passed its third quarter dividend on common stock.

The Sheet & Tube company reduces production schedules to a 50 per cent basis for the week.

Of 51 independent open-hearth furnaces, 25 are operating, with Bessemer steel capacity active at 50 per cent. Much of the current Bessemer output is being absorbed in pipe making.

Philadelphia sales office of Cutler-Hammer, Inc., is now situated in the new Terminal Commerce Building, 401 North Broad Street. The new quarters include warehouse facilities. F. J. Burd is manager.

BUFFALO

Pig Iron Sales 6000 Tons or More—Steel Operations Unchanged

BUFFALO, Sept. 30.—Aggregate sales of pig iron in the past week are estimated at 6000 to 7000 tons. Not so much inquiry is coming out. An Eastern user is asking for 1000 tons of malleable. Canal shipments show no decrease. Prices in the district remain firm at \$18.50, base. Furnace operation is unchanged.

Prices per gross ton, f.o.b. furnace:
No. 2 fdy., sil. 1.75 to 2.25.....\$18.50
No. 2X fdy., sil. 2.25 to 2.75..... 19.00
No. 1 fdy., sil. 2.75 to 3.25..... 20.00
Malleable, sil. up to 2.25..... 19.00
Basic..... 17.50
Lake Superior charcoal..... 27.28

Finished Steel

Operations of Buffalo mills are about the same as a week ago. The Lackawanna plant of the Bethlehem Steel Co. is operating 13 open-hearths; the Donner plant of the Republic Steel Corpn. is operating four; Wickwire-Spencer, three; and the Gould Coupler Co., one. The Seneca Iron & Steel Co. continues to operate at 45 to 50 per cent. A Buffalo fabricator took 100 tons of structural steel for a local factory building and another took 600 tons of structural steel for the Central Union School at Niagara Falls, N. Y. Another structural commitment was 200 tons for an assembly building in connection with a shrine at Auriesville, N. Y.

Old Material

Reports of a sale of 7000 tons of No. 1 heavy melting steel to a Buffalo user are denied. The reported price was \$13.75. New business is slack. Although it is understood that the largest consumer in the district will pay \$12.50 for No. 1 heavy melting steel, no dealer is anxious to take advantage of this offer. With one of the principal consumers of No. 1 machinery cast and stove plate working only three days a week, the demand for these grades is slow. A small ton-

Warehouse Prices, f.o.b. Buffalo

Base per Lb.

Plates and struc. shapes.....	3.25c.
Soft steel bars.....	3.15c.
Reinforcing bars.....	2.95c.
Cold-fin. flats and sq.....	3.65c.
Rounds and hex.....	3.15c.
Cold-rolled strip steel.....	5.85c.
Black sheets (No. 24).....	4.20c.
Galv. sheets (No. 24).....	4.60c.
Bands.....	3.50c.
Hoops.....	3.90c.
Blue ann'd sheets (No. 10).....	3.50c.
Com. wire nails, base per keg.....	\$2.60
Black wire, base per 100 lb.....	3.20

nage of No. 1 machinery cast is reported to have been sold at \$11.25 and a very small lot of stove plate at \$10.25 to \$10.50.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:

No. 1 heavy melting steel.....	\$12.75 to \$13.25
No. 2 heavy melting scrap.....	11.00 to 12.00
Scrap rails.....	12.00 to 12.50
Hydraulic comp. sheets.....	11.25 to 12.25
Hand bundled sheets.....	9.00 to 9.50
Drop forge flashings.....	11.00 to 11.50
No. 1 busheling.....	11.25 to 12.50
Hvy. steel axle turnings.....	11.00 to 11.50
Machine shop turnings.....	6.00 to 7.00
No. 1 railroad wrought.....	10.00 to 10.50

Acid Open-Hearth Grades:

Knuckles and couplers.....	15.00 to 15.50
Coil and leaf springs.....	15.00 to 15.50
Rolled steel wheels.....	15.00 to 15.50
Low phos. billet and bloom ends.....	16.50 to 17.00

Electric Furnace Grades:

Short shov. steel turnings.....	9.75 to 10.25
---------------------------------	---------------

Blast Furnace Grades:

Short mixed borings and turnings.....	7.50 to 8.00
Cast iron borings.....	7.50 to 8.00
No. 2 busheling.....	7.00

Rolling Mill Grades:

Steel car axles.....	16.00 to 16.50
Iron axles.....	19.00 to 19.50

Cupola Grades:

No. 1 machinery cast.....	11.00 to 12.00
Stove plate.....	10.25 to 10.50
Locomotive grate bars.....	8.25 to 9.25
Steel rails, 3 ft. and under.....	16.00 to 16.50
Cast iron carwheels.....	13.50 to 14.00

Malleable Grades:

Industrial.....	14.25 to 15.25
Railroad.....	14.25 to 15.25
Agricultural.....	14.25 to 15.25

Special Grades:

Chemical borings.....	11.50 to 12.00
-----------------------	----------------

Pig Iron Firm and Coal and Coke Firm Unite

Waldo, Egbert & Maltby, Inc., of Buffalo and the Wieman & Ward Co. of Pittsburgh have united, the new firm to be known as Waldo, Egbert, Maltby & Ward, Inc., with general offices in the Liberty Bank Building, Buffalo, and a Pittsburgh office in the Union Trust Building. Waldo, Egbert & Maltby have been sales agents for blast furnaces and a number of coal and coke operations and sole distributors of merchant iron produced by the furnaces of the Wickwire-Spencer Steel Corpn., Buffalo. The Wieman & Ward Co. has served as exclusive sales agents for a number of coal mines and coke plants, among which is the Pleasant Valley Mining Co., Uniontown, Pa., which produces about 1,000,000

tons of coal annually and has 1100 beehive coke ovens.

Officers of the united firm are: Fred J. Waldo, president; Justus Egbert, vice-president and treasurer; George A. Maltby, vice-president; Charles S. B. Ward, vice-president; Elmer E. Finck, secretary; Michael F. Selbert, assistant secretary; Arthur J. McCarthy, assistant treasurer. The first four named, together with John H. Bradley and Ward A. Wickwire of Buffalo, constitute the board of directors. Mr. Ward is president of the Pleasant Valley Mining Co. and also is president of the American Wholesale Coal Association.

Plans for a new steel warehouse to be constructed at Hammond, Ind., have been announced by the W. G. Holliday Co., Indianapolis.

▲▲ Semi-Finished Steel, Raw Materials, Bolts and Rivets ▲▲

Mill Prices of Semi-Finished Steel

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	\$31.00
Rerolling, 4-in. and under 10-in., Youngstown	31.00
Rerolling, 4-in. and under 10-in., Cleveland	31.00
Rerolling, 4-in. and under 10-in., Chicago	32.00
Forging quality, Pittsburgh	36.00

Sheet Bars (Open Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	\$31.00
Youngstown	31.00
Cleveland	31.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)	Per Gross Ton
Pittsburgh	\$31.00
Youngstown	31.00
Cleveland	31.00

Skelp (F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.70c.
Universal	1.70c.
Sheared	1.70c.

Wire Rods (Common soft, base)

	Per Gross Ton
Pittsburgh	\$36.00
Cleveland	36.00
Chicago	37.00

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria	8c. to 9c.
Iron ore, low phos., Swedish, average 68% iron	11c.
Iron ore, basic Swedish, average 65% iron	9c.
Manganese ore, washed 52% manganese, from the Caucasus	26c. to 28c.
Manganese ore, Brazilian, African or Indian, basic 50%	26c. to 28c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$12.00 to \$14.00

	Per Gross Ton
Chrome ore, 45 to 50% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	\$22.00 to \$24.00
	Per Lb.
Molybdenum ore, 85% concentrates of MoS ₂ delivered	50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$2.60 to \$2.65
Foundry, f.o.b. Connellsville prompt	3.25 to 4.75
Foundry, by-products, Ch'go ovens	8.00
Foundry, by-products, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, by-product, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.25 to \$1.35
Mine run coking coal, f.o.b. W. Pa. mines	1.40 to 1.50
Gas coal, 3/4-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	.55 to .65
Gas slack, f.o.b. W. Pa. mines	.90 to 1.00

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	\$94.00 to \$99.00
Foreign, 80%, Atlantic or Gulf port, duty paid	94.00 to 99.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	\$31.00 to \$33.00
Domestic, 16 to 19%	29.00 to 32.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	\$83.50
75%	130.00
	Per Gross Ton Furnace
10%	\$35.00
11%	37.00
	Per Gross Ton Furnace
12%	\$35.00
14%	39.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace			
Per Gross Ton		Per Gross Ton	
.....	\$26.50 13%	.....	\$32.50
.....	28.50 14%	.....	34.50
.....	30.50 15%	.....	37.00

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace			
Per Gross Ton		Per Gross Ton	
6%	.....\$21.00	11%	.....\$24.00
7%	.....21.50	12%	.....25.00
8%	.....22.00	13%	.....27.00
9%	.....22.50	14%	.....29.00
10%	.....23.00	15%	.....31.00

Delivered prices at Chicago are about 50c. a ton below this schedule.

Other Ferroalloys

Ferrotungsten, per lb. contained metal del'd	\$1.30 to \$1.40
Ferrocromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrovandium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65
Ferrocobaltititanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	\$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton	\$91.00
Ferrophosphorus, electric 24%, f.o.b. Anniston, Ala., per gross ton	\$122.50

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	\$18.00
No. 2 lump, Illinois and Kentucky mines	20.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	\$17.00 to \$17.50
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silica, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick

	Per 1000 f.o.b. Works	
	High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania . . .	\$43.00 to \$46.00	\$35.00 to \$38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 65.00	.....
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	\$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	\$8.50 to 10.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Standard size	45.00

Chrome Brick

	Per Net Ton
Standard size	\$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	73
Carriage bolts	73
Lag bolts	73
Flow bolts, Nos. 1, 2, 3 and 7 heads	73
Hot-pressed nuts, blank or tapped, square	73
Hot-pressed nuts, blank or tapped, hexagons	73
C.p.c. and t. square or hex. nuts, blank or tapped	73
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to and including 1/2 in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	73
Semi-finished hexagon castellated nuts, S.A.E.	73
Stove bolts in packages, P'gh.	80, 10, 10 and 5
Stove bolts in packages, Chicago	80, 10, 10 and 5
Stove bolts in packages, Cleveland	80, 10, 10 and 5
Stove bolts in bulk, P'gh.	80, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Chicago	80, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Cleveland	80, 10, 10, 5 and 2 1/2
Tire bolts	60, 10 and 10

Discounts of 73 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets (1/2-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	\$2.75
F.o.b. Chicago	2.85

Small Rivets

(3/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S. thread	85 and 10
Upset hex. cap screws, S.A.E. thread	85 and 10
Upset set screws	80, 10 and 5
Milled studs	70

▲▲▲ Mill Prices of Finished Iron and Steel Products ▲▲▲

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.65c.
F.o.b. Chicago.....	1.70c.
Del'd Philadelphia.....	1.94c.
Del'd New York.....	1.98c.
F.o.b. Cleveland.....	1.60c. to 1.65c.
F.o.b. Lackawanna.....	1.70c. to 1.75c.
F.o.b. Birmingham.....	1.85c.
C.i.f. Pacific ports.....	2.25c.
F.o.b. San Francisco mills.....	2.25c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.....	1.70c. to 1.75c.
F.o.b. Birmingham, mill lengths.....	1.85c.

Rail Steel

F.o.b. mills, east of Chicago dist.....	1.60c.
F.o.b. Chicago Heights mill.....	1.65c.
Del'd Philadelphia.....	1.84c. to 1.89c.

Iron

Common iron, f.o.b. Chicago.....	1.70c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.09c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.60c.
F.o.b. Chicago.....	1.70c. to 1.75c.
F.o.b. Birmingham.....	1.80c. to 1.85c.
Del'd Cleveland.....	1.78½c.
Del'd Philadelphia.....	1.80½c. to 1.85½c.
F.o.b. Coatesville.....	1.70c.
F.o.b. Sparrows Point.....	1.70c.
F.o.b. Lackawanna.....	1.70c.
Del'd New York.....	1.88c.
C.i.f. Pacific ports.....	2.15c. to 2.25c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.60c.
F.o.b. Chicago.....	1.70c. to 1.75c.
F.o.b. Birmingham.....	1.80c. to 1.85c.
F.o.b. Lackawanna.....	1.70c. to 1.75c.
F.o.b. Bethlehem.....	1.70c.
Del'd Cleveland.....	1.78½c.
Del'd Philadelphia.....	1.71c. to 1.76c.
Del'd New York.....	1.85½c.
C.i.f. Pacific ports.....	2.15c. to 2.25c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh.....	1.75c.
Wider than 6 in., P'gh.....	1.65c.
6 in. and narrower, Chicago.....	1.85c.
Wider than 6 in., Chicago.....	1.75c.
Cooperage stock, P'gh.....	1.90c. to 2.00c.
Cooperage stock, Chicago.....	2.00c. to 2.10c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.10c.
Bars, f.o.b. Chicago.....	2.10c.
Bars, Cleveland.....	2.10c.
Bars, Buffalo.....	2.10c.
Shafting, ground, f.o.b. mill.....	2.45c. to 3.40c.
Strips, P'gh.....	2.35c. to 2.45c.
Strips, Cleveland.....	2.35c. to 2.45c.
Strips, del'd Chicago.....	2.63c. to 2.73c.
Strips, Worcester.....	2.60c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	3.60c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Merchant Trade

	Base per Keg
Standard wire nails.....	\$2.00 to \$2.10
Cement coated nails.....	2.00 to 2.10
Galvanized nails.....	4.00 to 4.10

	Base per Lb.
Polished staples.....	2.60c. to 2.70c.
Galvanized staples.....	2.85c. to 2.95c.
Barbed wire, galvanized.....	2.80c. to 2.90c.
Annealed fence wire.....	2.15c. to 2.25c.
Galvanized wire, No. 9.....	2.60c. to 2.70c.
Woven wire fence (per net ton to retailers).....	\$65.00

To Manufacturing Trade

Bright hard wire, Nos. 6 to 9 gage.....	2.30c.
Spring wire.....	3.30c.

(Carload lots, f.o.b. Chicago)

Wire nails.....	\$2.10 (keg)
Annealed fence wire.....	2.40c. to 2.50c. (lb.)
Bright hard wire to manufacturing trade.....	2.35c.

Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

Light Plates

Base per Lb.

No. 10, blue annealed, f.o.b. P'gh.....	1.90c. to 2.00c.
No. 10, blue annealed, f.o.b. Chicago dist.....	2.10c.
No. 10, blue annealed, del'd Phila.....	2.32c. to 2.42c.
No. 10, blue annealed, B'ham.....	2.15c.

Sheets

Blue Annealed

Base per Lb.

No. 13, f.o.b. P'gh.....	2.05c. to 2.15c.
No. 13, f.o.b. Chicago dist.....	2.25c.
No. 13, del'd Philadelphia.....	2.44c.
No. 13, blue annealed, B'ham.....	2.30c.
No. 24, f.o.b. Pittsburgh.....	2.45c.
No. 24, f.o.b. Chicago dist. mill.....	2.55c.
No. 24, del'd Philadelphia.....	2.74c.
No. 24, f.o.b. Birmingham.....	2.60c. to 2.65c.

Steel Furniture Sheets

No. 24, f.o.b. P'gh.....	3.60c. to 3.70c.
--------------------------	------------------

Galvanized

No. 24, f.o.b. Pittsburgh.....	3.00c. to 3.10c.
No. 24, f.o.b. Chicago dist. mill.....	3.10c. to 3.20c.
No. 24, del'd Cleveland.....	3.18½c. to 3.28½c.
No. 24, del'd Philadelphia.....	3.29c. to 3.39c.
No. 24, f.o.b. Birmingham.....	3.15c. to 3.20c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	2.70c. to 2.80c.
No. 28, f.o.b. Chicago dist. mill.....	2.80c. to 2.90c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	3.50c.
--------------------------------	--------

Long Termes

No. 24, 8-lb. coating, f.o.b. mill.....	3.45c. to 3.55c.
---	------------------

Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh.....	3.80c.
--------------------------------	--------

Tin Plate

Per Base Box

Standard cokes, f.o.b. P'gh district mills.....	\$5.25
Standard cokes, f.o.b. Gary.....	5.35

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C. \$10.30 25-lb. coating I.C. \$15.20	
15-lb. coating I.C. 12.90 30-lb. coating I.C. 16.00	
20-lb. coating I.C. 14.00 40-lb. coating I.C. 17.80	

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.65c. per Lb.

S.A.E. Series Numbers	Alloy Differential
2000 (1½% Nickel).....	\$0.25
2100 (1¼% Nickel).....	0.55
2300 (3¼% Nickel).....	1.50
2500 (5% Nickel).....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.80
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum 1.25 to 1.75 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bar.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (flats).....	0.25
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot rolled steel bars, forging quality. The differential for cold-drawn bars is ¼c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

Per Gross Ton

Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	34.00
Light (from rail steel), f.o.b. mill.....	32.00
Light (from billets), f.o.b. Ch'go mill.....	36.00

Track Equipment

Base per 100 Lb.

Spikes, ¾ in. and larger.....	\$2.80
Spikes, ½ in. and smaller.....	2.80
Spikes, boat and barge.....	3.00
Tie plate, steel.....	2.07½

Angle bars.....	\$2.75
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	73 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1/8	47	21½	1/8 and 3/8	+11	+36
1/4 to 3/8	53	27½	1/2	23	5
1/2	58	44½	3/4	28	11
3/4	62	50½	1 and 1¼	31	15
1 to 3	64	52½	1½ and 2	35	18

Lap Weld

2	57	45½	2	23	9
2½ to 6	61	49½	2½ to 3½	28	13
7 and 8	58	45½	4 to 6	30	17
9 and 10	56	43½	7 and 8	29	16
11 and 12	55	42½	9 to 12	25	11

Butt Weld, extra strong, plain ends

1/8	43	26½	1/4 and 3/8	+13	+48
1/4 to 3/8	49	32½	1/2	23	7
1/2	55	44½	3/4	28	12
3/4	60	49½	1 to 2	34	18
1 to 1½	62	51½			
2 to 3	63	52½			

Lap Weld, extra strong, plain ends

2	55	44½	2	29	13
2½ to 4	59	48½	2½ to 4	34	20
4½ to 6	58	47½	4½ to 6	35	19
7 to 8	54	41½	7 and 8	31	17
9 and 10	47	34½	9 to 12	21	8
11 and 12	46	33½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discount of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1½ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—3½ in.	54	2½ in.—2¾ in.	16
4 in.	57	3 in.	17
4½ in. to 6 in.	46	3½ in. to 3¾ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn		Hot Rolled	
1 in.	61	3 in.	46
1¼ to 1½ in.	53	3½ to 3¾ in.	43
1¾ in.	27	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Beyond the above base discount a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List

Carbon, 0.10% to 0.30% base (carloads).....	55
Carbon, 0.30% to 0.40% base.....	50
Plus differentials for lengths over 15 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

Fabricated Structural Steel

New Projects of 24,000 Tons Include 5000-Ton Viaduct— Awards Only 15,000 Tons

NEW projects requiring fabricated steel reached a total of only about 24,000 tons this week, compared with 37,000 tons a week ago. Included were two apartment buildings in New York, one of 1500 tons on Hudson Street, another of 2000 tons on East Fifty-eighth Street, a 2500-ton building in Philadelphia for the Girard Trust Co., 5000 tons for the Western Hill viaduct in Cincinnati and 1760 tons for highway bridges at Carrollville, Wis.

The total of awards was one of the smallest of the year, at slightly in excess of 15,000 tons. The only awards of size were 2700 tons for the Steinmetz School in Chicago, 1000 tons for a hospital building in Brooklyn, 1000 tons for a Y. M. C. A. building on West Twenty-second Street, New York, and 1100 tons for a medical school at Columbia University, New York. Awards follow:

North Atlantic States

HARTFORD, CONN., 300 tons, two airplane hangars, for United Airports, to Levering & Garrigues Co.
CAMBRIDGE, MASS., 275 tons, Harvard freshman dormitory, to New England Structural Co.
BOSTON & MAINE RAILROAD, 100 tons, signal bridges, to Boston Bridge Works, Inc.
NEW YORK, 517 tons, addition to Hudson Street station of New York Edison Co., to Levering & Garrigues Co.
NEW YORK, 1000 tons, Y. M. C. A. building on West Twenty-second Street, to Post & McCord.
NEW YORK, 1100 tons, medical school for Columbia University, to Hedden Iron Construction Co.
BROOKLYN, 1000 tons, hospital building, to George A. Just.
BUFFALO, 100 tons, new factory for W. A. Case & Son Mfg. Co., to Kellogg Structural Steel Co.
ACRISVILLE, N. Y., 200 tons, assembly building for a Roman Catholic shrine, to McClintic-Marshall Co.
NIAGARA FALLS, N. Y., 600 tons, Central Union School, to Buffalo Structural Steel Co.
PHILADELPHIA, 500 tons, building for Wheeling Corrugating Co., reported to Belmont Iron Works.
BALTIMORE, 135 tons, Baltimore & Ohio freight house, to Dietrich Brothers.

The South

BIRMINGHAM, 200 tons, foundry and pattern shop addition for Crane Co., to Southern Steel Works.
NEW ORLEANS, 100 tons, Singer Sewing Machine Co. office building, to Southern Steel Works.

Central States

CLEVELAND, 575 tons, Cleveland Clinic, to McClintic-Marshall Co.
CINCINNATI, 475 tons, Frays building, to Schriver Co.
MILWAUKEE, 330 tons, Home Savings Bank, to Worden-Allen Co.
CHICAGO, 900 tons, Rapid Transit Co. platforms, to Hansell-Elcock Co.
CHICAGO, 2700 tons, Steinmetz School, to Midland Structural Steel Co.
CHICAGO, 125 tons, balconies for Fine Arts building, to Hansell-Elcock Co.
STATE OF MINNESOTA, 630 tons, highway bridges; 400 tons, to Minneapolis-Moline Power Implement Co., 230 tons to American Bridge Co.
STATE OF SOUTH DAKOTA, 285 tons, highway bridges, to Minneapolis-Moline Power Implement Co.

Western States

LONG BEACH, CAL., 125 tons, school auditorium, to Pacific Iron & Steel Co.

LOS ANGELES, 200 tons, steel joists for several buildings, to Soule Steel Co.
SAN FRANCISCO, 470 tons, H-columns for Honolulu Oil Co., to Pacific Coast Steel Corp.
SAN FRANCISCO, 270 tons, apartment building on Vallejo Street, to McClintic-Marshall Co.
LIVERMORE, CAL., 176 tons, rock crushing plant, to Western Iron Works.

Canada

MOOSE RIVER, ONT., 2000 tons, bridge over Moose River for Temiskaming & Northern Ontario Railway, to Hamilton Bridge Co.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

SOUTHBRIDGE, MASS., 100 tons, hospital.
WORCESTER, MASS., 170 tons, State normal school.
BOSTON, 255 tons, South Boston bath house.
FITCHBURG, MASS., 700 tons, plant for Simonds Saw & Steel Co.
NEW YORK, 1500 tons apartment building on Hudson Street.
NEW YORK, 1000 tons, apartment building on Christopher Street. Former bids rejected; new bids being taken.
NEW YORK CENTRAL RAILROAD, 200 tons, Grade crossing elimination.
NEW YORK, 2000 tons, apartment building on East Fifty-eighth Street.
PLATTSBURG, N. Y., 650 tons, normal school building.
PHILADELPHIA, 550 tons; bridge at Mascher Street over Reading Railroad, 300 tons, and bridge at Rising Sun Avenue and Bristol Street over Philadelphia, Newtown & New York Railroad, 250 tons.
PHILADELPHIA, 2500 tons, Girard Trust Co. building.
STATE OF PENNSYLVANIA, 700 tons, bridge in Lycoming County; T. J. Foley, Pittsburgh, low bidder for general contract.
POTTSVILLE, PA., 400 tons, garage.
OIL CITY, PA., 1000 tons, foundry for National Transit Pump & Machine Co.
PITTSBURGH, 760 tons, Ardmore Boulevard bridge; Herkner Co., Cleveland, low bidder on general contract.
NEW CASTLE, PA., 200 tons, State highway bridge; Whitaker & Diehl, general contractors.

The South

LATONIA, KY., 200 tons, building for Standard Oil Co.

Central States

CINCINNATI, 5000 tons, Western Hill viaduct; bids on general contract to be opened Oct. 22.

TOLEDO, 700 tons, United States Court House.

LA CROSSE, WIS., 325 tons, State highway bridge in Trempealeau County; bids close Oct. 10.

CARROLLVILLE, WIS., 400 tons for Newport Chemical Co.

STATE OF MISSOURI, 1760 tons, highway bridges.

Western States

LOS ANGELES, 560 tons, bridge over Los Angeles River; Oberg Brothers, general contractors.

PHOENIX, ARIZ., 300 tons, bridge on Flagstaff Highway; bids Oct. 15.

SAN FRANCISCO, 2400 tons, Mills building; bids Oct. 9.

Canada

CHATHAM, ONT., 200 tons, municipal bridge over River Thames; A. L. Thompson, city manager.

TORONTO, 300 tons, municipal bridge over Humber River; Bert S. Wemp, chairman of Board of Control.

Railroad Equipment

Milwaukee Road will build 10 mail-express cars in its own shops.

Burlington will build 10 baggage cars in its own shops.

Erie Railroad has ordered two mail-baggage cars from Bethlehem Steel Co., instead of American Car & Foundry Co., as recently reported.

Baltimore & Ohio is in the market for 25 Santa Fe and 25 mountain type locomotives.

New Publication on Far Eastern Mining

The Mineral Industry of the Far East, by Boris P. Torgasheff, has been published in Shanghai, China, by the Chali Co., 6 Kiukiang Road. The volume, consisting of 516 pages, 320 statistical tables and 14 maps, outlines and gives detailed information on the mining industries in China, Manchuria, Japan, Chosen, Formosa, Indo-China, Philippine Islands and eastern Russia. Most of the information included in this work was obtained by the author through direct contact with the sources of information throughout the Far East.

Blast Furnace Scrap Weaker at Detroit

DETROIT, Sept. 30.—The scrap market reflects curtailed production on the part of consumers, who are showing little interest in forward buying. Blast furnace grades in particular have weakened and are selling at 25c. to 50c. a ton less than a week ago. October scrap lists put out by automobile companies are approximately the same size as in September.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov.	
steel	\$11.25 to \$11.75
Borings and short turnings	5.50 to 6.00
Long turnings	5.50 to 6.00
No. 1 machinery cast	11.00 to 11.50
Automotive cast	12.25 to 12.75
Hydraul. comp. sheets	11.25 to 11.75
Stove plate	9.00 to 9.50
New No. 1 busheling	9.50 to 10.00
Old No. 2 busheling	5.50 to 6.00
Sheet clippings	8.00 to 8.50
Flashings	10.00 to 10.50

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

Copper at 10c. Lowest in 34 Years—Tin Down to 1922 Levels

NEW YORK, Sept. 30.

Copper

A new low in 34 years was reached today by electrolytic copper. All producers are now selling the metal at 10c., delivered in the Connecticut Valley. Gradual reductions in quotations, largely by custom smelters since a week ago, when the price was 10.50c., is one of the causes. Effective today, Copper Exporters, Inc., reduced the price to 10.30c., c.i.f. usual European ports. Inquiries from domestic consumers at the new low level are large, but most companies are limiting their sales. The metal cannot be bought beyond December delivery. Consumers abroad are more interested, and sales this morning were more than 1000 tons, with the total for the month probably reaching 25,000 tons, which is better than in August.

Many believe that the market has hit rock bottom but, in view of the recent past, there is nothing certain about this. It is argued that copper is a splendid investment at the 10c. level, but it is also stated that it was a good investment at 11c. Most of the buying is for late delivery, although some sellers report sales for October shipment, indicating that some consumers have booked new business to be fabricated. In general, domestic buying for the immediate future will be largely for investment reasons rather than for actual consumption. Foreign consumers are not covered far ahead. Lake copper is in a position similar to electrolytic copper as to demand, with the quotation 10c. to 10.12½c., delivered.

Copper Averages

The average price of Lake copper for September, based on daily quotations in THE IRON AGE, is 10.79½c., delivered New York. The average price of electrolytic copper is 10.37½c. refinery, or 10.62½c., delivered in the Connecticut Valley.

Tin

In sympathy with the decline in commodities in general and in copper in particular, tin has fallen to the lowest level since early in 1922. Spot straits tin was sold yesterday at 28.62½c. This is the lowest price since March 16, 1922, when the same quotation prevailed. Today the quotation was 28.75c., New York. London prices have fallen precipitately and today stood as follows: Spot standard £125 5s., future standard £126 15s., and spot Straits £128 5s., with sales of spot standard at 100 tons and

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Sept. 30	Sept. 29	Sept. 27	Sept. 26	Sept. 25	Sept. 24
Lake copper, New York.....	10.12½	10.12½	10.62½	10.62½	10.62½	10.62½
Electrolytic copper, N. Y.*.....	9.75	9.75	10.00	10.12½	10.12½	10.12½
Straits tin, spot, N. Y.	28.75	28.62½	....	29.15	29.37½	29.70
Zinc, East St. Louis.....	4.25	4.25	4.25	4.25	4.25	4.25
Zinc, New York.....	4.60	4.60	4.60	4.60	4.60	4.60
Lead, East St. Louis.....	5.35	5.35	5.35	5.35	5.35	5.35
Lead, New York.....	5.50	5.50	5.50	5.50	5.50	5.50

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

future standard at 900 tons. The Singapore price today was £132 10s., with sales at 325 tons. On the decline a very large business has been done in this market, sales totaling several thousand tons, practically all to consumers.

Statistics for September show that the deliveries into consumption in this country were 7250 tons, which were larger than expected. Tin in stocks and landing were 6323 tons. Stocks in London warehouses for the week ended Saturday, Sept. 22, were 25,148 tons, a decrease of 318 tons, the first decline in many weeks.

Lead

Sharp declines in the London market have affected demand here, and the market is quiet. Thus far prices are unchanged at 5.35c., St. Louis, from the leading producer in that dis-

trict, and at 5.50c., New York, as the contract price of the American Smelting & Refining Co.

Antimony

In a quiet market Chinese metal is quoted at 7.50c., duty paid, New York, for all positions.

Zinc

London prices have declined sharply, but there has been no effect on domestic quotations. Prime Western zinc is still strongly held by most producers at 4.25c. a lb., East St. Louis, or 4.60c., New York, though there are rumors that 4.22½c. could possibly be done. A little business is being transacted but naturally the total is not large.

Ore in the Joplin district is unchanged at \$30 a ton, with sales for the week at 7420 tons. Production

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	17.00c.
Copper, hot rolled, base sizes.....	20.00c.
Copper, cold rolled, 14 oz. and heavier, base sizes.....	22.25c.
Seamless Tubes—	
Brass	22.00c.
Copper	22.25c.
Brass Rods	15.12½c.
Brazed Brass Tubes.....	24.67½c.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9),	9.75c. to 10.25c.
casks	10.75c. to 11.25c.
Zinc sheets, open.....	10.75c. to 11.25c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig.....	31.50c. to 32.50c.
Tin, bar	33.50c. to 34.50c.
Copper, Lake	11.75c.
Copper, electrolytic	11.50c.
Copper, casting	11.25c.
Zinc, slab	6.00c. to 7.00c.
Lead, American pig.....	6.00c. to 7.00c.
Lead, bar	8.00c. to 9.00c.
Antimony, Asiatic	10.00c. to 10.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure).....	24.00c. to 25.00c.
Alum. ingots, No. 12 alloys	23.00c. to 24.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ½.....	22.00c. to 23.00c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig.....	34.25c.
Tin, bar	36.25c.
Copper, Lake	11.63c.
Copper, electrolytic	12.25c.
Copper, casting	11.25c.
Zinc, slab	5.75c. to 6.00c.
Lead, American pig.....	6.25c. to 6.50c.
Lead, bar	8.75c.
Antimony, Asiatic	12.50c.
Babbitt metal, medium grade.....	17.50c.
Babbitt metal, high grade.....	37.50c.
Solder, ½ and ½.....	21.50c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses. (Prices quoted are nominal. Holders of metal are generally unwilling to part with stock at present low levels.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.25c.	9.25c.
Copper, hvy. and wire	8.00c.	9.00c.
Copper, light and bottoms	7.00c.	8.00c.
Brass, heavy	4.75c.	6.00c.
Brass, light	3.75c.	5.00c.
Hvy. machine composition	7.25c.	8.25c.
No. 1 yel. brass turnings	5.25c.	6.00c.
No. 1 red brass or compos. turnings...	6.50c.	7.50c.
Lead, heavy.....	4.25c.	4.75c.
Lead, tea.....	3.00c.	3.50c.
Zinc	2.25c.	2.75c.
Sheet aluminum.....	7.50c.	9.50c.
Cast aluminum.....	7.00c.	9.00c.

was about 8500 tons and shipments close to 7000 tons, leaving the estimated surplus at 38,178 tons.

Nickel

With no change in the long-established quotations, wholesale lots of ingot nickel stand at 35c. a lb., with shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

Aluminum

Virgin metal, 98 to 99 per cent pure, is obtainable at the published price of 22.90c. a lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO, Sept. 30.—Prices for most non-ferrous metals are leaning to the weak side. Revisions downward this week are especially notable in copper, tin and antimony. Sales are on a par with the volume a week ago. The old metal market is quiet.

Prices per lb., in carload lots: Lake copper, 10.62½c.; tin, 29.40c.; lead, 5.45c.; zinc, 4.35c.; in less-than-carload lots, antimony, 8.75c. On old metals we quote copper wire, crucible shapes and copper clips, 8.50c.; copper bottoms, 7c. to 7.50c.; red brass, 7c. to 7.50c.; yellow brass, 5c. to 5.25c.; lead pipe, 4c.; zinc, 1.50c. to 1.75c.; pewter, No. 1, 15c.; tin-foil, 17.50c.; block tin, 22.50c.; aluminum, 6.50c. to 7c.; all being dealers' prices for less-than-carload lots.

Ohio Foundries Association

The Ohio Foundries Association, Inc., will hold its annual meeting and a sectional conference at the Deshler-Wallick Hotel, Columbus, Nov. 13. Two speakers are scheduled to address a noon meeting on subjects of general interest to all foundrymen, after which those in attendance will divide into four groups for discussion of problems of the different branches of the foundry industry.

Alvan T. Simonds of the Simonds Saw & Steel Co., Fitchburg, Mass., has announced the winners of his annual economic contest for 1929, in which essays were submitted on the subject, "The Federal Reserve System and the Control of Credit." The first prize of \$1,000 was awarded to Walter Earl Spahr, professor of economics and chairman of the Department of Economics, School of Commerce, Accounts and Finance, New York University, and the second prize of \$500 was awarded to Ivan W. Elder, managing editor of the North Pacific Banker, Portland, Ore.

Newark Wire Cloth Co., 351 Verona Avenue, Newark, N. J., manufacturer of wire cloth for all industrial purposes, is now manufacturing wire cloth of stainless steel. This cloth is made in all meshes, widths and lengths, and will be made as fine as 200 x 200 (40,000 openings per sq. in.).

Reinforcing Steel

Warehouse for Lehigh Valley Railroad Takes 5000 Tons

AWARDS of reinforcing steel the past week amounted to 10,850 tons, the largest total since May 15. The Lehigh Valley Railroad will take 5000 tons for a warehouse in New York. Lettings in September totaled 14,225 tons, compared with 25,500 tons in August. New jobs up for bids call for 3900 tons, the largest, 1000 tons, for a stadium at Cleveland. Estimates on several buildings in Chicago have not yet been given out. Awards follow:

BOSTON, 200 tons, Western Union building, to Concrete Steel Co.
BERGEN COUNTY, N. J., 1700 tons pavement work on New Jersey side of Fort Lee bridge, to Buffalo Steel Co.
NEW YORK, 5000 tons, Lehigh Valley Railroad warehouse, Eleventh Avenue and Twenty-sixth Street, to National Bridge Works.
BROOKLYN, 1000 tons, sewer, Avenue X, to Igoe Brothers.
HILLSDALE, N. J., 100 tons, hospital for New Jersey Department of Institutions, to Kalman Steel Co.
BUFFALO, 1000 tons, Ford Motor Co. assembly plant, to Truscon Steel Co.
WILMETTE, ILL., 100 tons, Bahai Temple, to Concrete Engineering Co.
CHICAGO, 220 tons, Ogden Avenue bridge, to Olney J. Dean & Co.
LA GRANGE, ILL., 110 tons, bridge, to Concrete Steel Co.
ST. LOUIS, 500 tons, section B, Maline Creek sewer for Board of Public Service, to Missouri Rolling Mills Corp'n.
LOS ANGELES, 100 tons, power house, 2904 West Eleventh Street, to an unnamed bidder.
LOS ANGELES, 300 tons, theater, 610

South Broadway, to an unnamed bidder.

LOS ANGELES, 210 tons, store, 610 South Hill Street, to an unnamed company.
LONG BEACH, CAL., 100 tons, school auditorium, to an unnamed company.
SAN BERNARDINO, CAL., 200 tons, hospital, to an unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

NEW YORK, 800 tons, Riverside Drive ramp from Fort Lee bridge; general contract awarded to William P. McGarry Co., Brooklyn.
QUANTICO, VA., 800 tons, barracks for United States Marine Corps.
WASHINGTON, 200 tons, three buildings for Howard University.
WASHINGTON, 100 tons, hotel; bids open Oct. 1.
CLEVELAND, stadium, 1000 tons.
CHICAGO, tonnage being estimated, several public schools.
CHICAGO, estimates being prepared, Fish Furniture store.
CHICAGO, 600 tons, International House at University of Chicago; Holabird & Root, architects.
PHOENIX, ARIZ., 140 tons, bridge on Flagstaff Highway; bids Oct. 15.
SEATTLE, 400 tons, Edmond Meany Hotel; sub-bids being taken.
LOS ANGELES, 100 tons, apartment building, 5542 Fernwood Avenue; bids being taken.
LOS ANGELES, 138 tons, Little Dalton Wash storm drain; Los Angeles Iron & Steel Co., low bidder.
LOS ANGELES, 301 tons, bridge over Los Angeles River; general contract to Oberg Brothers.
OAKLAND, CAL., 134 tons, two bridges across Crandall Slough; bids opened.
SAN FRANCISCO, 400 tons, Mills building; bids Oct. 9.

Smaller Imports of Pig Iron

Pig iron coming into the United States in August is reported by the Department of Commerce at 8747 gross tons, compared with 9756 tons in July and with 12,377 tons a year ago. Total for the eight months shows a drop from last year of 13½ per cent. Except for June, the August total was the lowest in more than a year.

British India supplied about 88 per cent of the August imports, compared with less than 60 per cent a year earlier. For the eight months, India supplied more than 75 per cent, against about 41 per cent in 1929.

Imports from India during the eight months have increased by 23,000 tons, whereas imports from all other countries have decreased by more than 35,000 tons.

The Carnegie Steel Co. has placed a contract with the Westinghouse Electric & Mfg. Co., Pittsburgh, for new electrical machinery to be used in construction of its bar mill, now under way at the McDonald plant, Trumbull County. This unit has been under construction for about five months and is scheduled for completion in March, 1931.

UNITED STATES IMPORTS OF PIG IRON BY COUNTRIES OF SHIPMENT
(In Gross Tons)

	August		Eight Months Ended August	
	1930	1929	1930	1929
United Kingdom .....	.....	3,903	7,148	31,187
British India	7,746	7,227	60,497	37,786
Germany .....	.....	.....	50	103
Netherlands	160	737	5,712	19,029
Canada .....	.....	238	392	763
France .....	.....	.....	.....	101
Belgium	100	.....	100	184
Norway	50	101	2,781	1,441
Sweden	539	106	2,608	1,415
All others	102	65	768	572
Total	8,747	12,377	80,056	92,581

Automobile Makers Turn to Lower Prices to Stimulate Sales

DETROIT, Sept. 29.

WITH the motoring public showing extreme conservatism in making purchases of new cars, partly on account of economic necessity and partly because of the desire in the present depression to accumulate rather than expend its resources, it is not strange that automobile manufacturers are turning to deep price cuts or their equivalent as a trump card in their selling program. These makers would be the first to object to characterizing recent developments as the outcropping of a price war; and they would be correct in denying this, for the situation is in nowise a "price war" as one ordinarily thinks of such destructive competition.

The fact is that all companies realize they are facing perhaps the greatest sales resistance in the history of the industry and that the only way to overcome this resistance is to offer the greatest possible value for the smallest amount of money. This is a buyer's market and is likely to continue so for some time. Low prices for a quality article appeal more than ever to the public. It is to this factor that individual makers are looking for support of their selling program.

Prices have been consistently lowered in the small car field. They are on such an economical plane that no spectacular cuts can be expected, although further scaling down in the near future would not surprise the industry. To get a full realization of what has been happening in this field, however, it is necessary to go back only a few years and compare the product then with that which the public is buying for considerably less money today. The public has gained an astonishing advantage.

The same condition exists in the medium-priced field, especially since the vogue for eight-cylinder cars started. The Essex and Pontiac in the lower medium-priced bracket have recently dipped to rock bottom; in the upper medium-priced class the Hudson, Studebaker and Buick have responded to the popular demand for a reduction in prices. Nash is promising the public a new low-priced six and an eight which may be sold for less money than other eights. Studebaker has just announced "free wheeling" as a feature of the new Dictator

In a buyer's market the automobile industry is using low retail prices as a trump card in its selling program.

* * *

Rouge plant of Ford Motor Co. operated on a three-day basis the past week as against a four-day schedule which previously had been consistently maintained since Aug. 4, when operations were resumed following a three weeks' shutdown.

* * *

The motorist paid \$49 less for his car in 1929 than in 1928 and \$135.10 less than in 1927. The average price last year was \$621.75, but that figure should shrink appreciably this year.

* * *

Passenger car production in this country this year has been 89 per cent of the average for the past six years and deliveries 92 per cent.

eight, which bears a close resemblance to the more expensive President and Commander eights. As an extra inducement it offers the Dictator at new low prices ranging from \$1,095 to \$1,250. Even here the downward movement does not stop, for the most astonishing slashes have been made in the quality group. Cadillac models now are selling for some \$900 less than formerly and the new Packard is a full \$1,000 under the old.

ONE may ask how companies can stand successive cuts or sensational drops in prices and still earn dividend requirements. In this regard it must be remembered that profits in recent years have been lucrative and in at least some cases have been far larger than average earnings in other industries. These profits can be pruned without impairing a fair return on the investment. Management, on the other hand, is examining every nook and corner of the production machinery, general overhead and selling department to discover new ways in which economies may be accomplished. The industry is seeking to buy parts and raw materials for less money, it is trying to get lower

freight rates on raw, semi-finished and finished products and wherever possible eliminate this charge entirely. The truth is that much of this effort is for the public's direct benefit, for the savings are being passed along to the car owner in efforts to tempt him to buy a new model instead of making the old one do for another year. In 1929 the motorist paid \$49 less for his automobile than in 1928 and \$135.10 less than in 1927. The average price which he paid last year for his car was \$621.75, but it is safe to say that that figure will shrink considerably before the present year is ended.

Automobile Makers Holding Output Close to Sales

THAT automobile makers are holding their production schedules close to actual requirements for retail sales is indicated by recent activities. Last week the Buick factory pushed up its output 100 cars a day. This is in accordance with the plan which the company is said to be following of readjusting its factory program every 10 days to conform to the volume of business reported by the sales department. The Rouge plant of the Ford Motor Co. operated on a three-day basis the past week and may do the same this week. The determining factor, as with other companies, will be the responsiveness of the public in buying Ford automobiles. The Chevrolet foundry at Saginaw got into production again on Sept. 22 and its operations in the next 30 days will be heavy. Other departments of the Chevrolet company are ready for a big push in October designed, so it is said, with the object of putting the new models on the market on or as near Nov. 1 as possible. Schedules of other automobile manufacturers have not been materially altered in the past week.

Chrysler Estimates Increased Production

AT a time when the automobile industry is casting about for facts on which to base a hopeful outlook for 1931, the estimates recently compiled by the statistical department of the Chrysler Corporation, which indicate that output of passenger cars for domestic consumption in the next five

years will be about 20 per cent greater than in the past five years, are attracting attention. This prediction is the result of an analysis covering the past 15 years. The department has found that production of passenger cars this year has been 89 per cent of the average for the past six years and deliveries 92 per cent. Retail sales of passenger cars in this country have been greater than in the corresponding period of 1927 and 1928, but lower

than in the same months of 1925, 1926 and 1929.

The survey reveals that the annual expenditure in the United States for new passenger cars is approximately \$23 per capita, or less than \$2 a month per capita. This optimistic statement by the Chrysler organization should be of special interest to iron and steel makers who are looking to the automobile industry for much of their business.

New Tariff Commissions Will Consider Pig Iron

WASHINGTON, Sept. 30. — Hearing under the flexible provision of the Hawley-Smoot tariff act will be held by the reorganized Tariff Commission on Oct. 30, while similar hearings will be held in Nov. 5 with regard to wire fencing and wire nettings. These hearings, like 33 others which are before the commission, grew out of resolutions offered in the Senate.

Producers of merchant pig iron and of wire fencing and netting are hoping to get increased duties as the result of the hearings. They will relate to differences in costs in the United States and abroad and other economic factors surrounding the affected industries. Much information with regard to the pig iron situation already is in the hands of the commission and will be brought up to date. The material was obtained when a previous investigation was made and brought about an increase of 50 per cent to a duty of \$1.12½ a ton on pig iron. The Hawley-Smoot duty is 75c.

The new commission announced dates for hearings under the flexible provision without first supplying domestic manufacturers and importers with preliminary statements of information, as has been done heretofore, but Chairman Henry P. Fletcher said the commission felt it was in such shape that it could go ahead with public hearings. This position was taken because much data to be used had been turned over to the new commission by the old organization.

The Hawley-Smoot flexible provision is designed to expedite investigations and promulgation of new rates. One means to this end is to do away with investigations abroad by commission agents. Instead greater reliance will be placed on ship invoices in getting differences in costs. Mr. Fletcher, however, did not state definitely that the investigations would be speeded up but expressed the hope that the work could be accelerated "without sacrificing the merits of the case." It is certain that the general feeling is that unless the investigations can be speeded up they will be well-nigh worthless. It was the great delay in completing investigations under the old provision that developed a widespread belief that it had little, if any, merit.

The new provision differs from the old one also in that the commission

itself is required to specify the rates necessary to equalize production costs in the United States and abroad and they must be accepted by the President or given a "pocket veto" through his failure to approve the recommendation. A pocket veto would mean that the rates would remain unchanged. As under the old law, rates may not be changed by more than 50 per cent either upward or downward.

Ford Plant in England Nearing Completion

An article in the September issue of *Anglo-American Trade*, published by the American Chamber of Commerce in London, England, contains the following facts regarding the new plant of the Ford Motor Co. of England, which is nearing completion at Dagenham, at the mouth of the River Thames:

The completed works will cover an area of 110 acres, the entire site consisting of 500 acres. The plant is being built on marshy land, requiring the driving of 10,000 reinforced concrete piles for the foundations. The manufacturing buildings, together with blast furnace, coke ovens and by-product plants, require 12,500 tons of steel. A concrete jetty, 51 ft. wide and 1800 ft. long, is being built for incoming and outgoing shipments. One portion will be reserved for outward shipment and can easily accommodate two 6000-ton ships, while another portion is for the accommodation of vessels bringing coal, ore and limestone to the blast furnace. The steel superstructure extending to the land will carry two Lake type unloaders, with an output of 600 tons per hour each. These will be the largest unloaders in Great Britain. Another portion of the jetty is reserved for handling refuse and will accommodate six 200-ton refuse barges at the same time. Considerable dredging is necessary to provide deep water for steamers to lie alongside this wharf.

The coke oven installation at the Dagenham plant will consist of 45 Wilputte coke ovens, capable of carbonizing 890 tons of coal a day, together with a complete coal and coke-handling plant and a by-product plant for the recovery of tar, and the manufacture of sulphate of ammonia and refined benzol. The coal and coke-handling plant will be almost entirely automatic.

Railroad Expenditures Large in First Half

Capital expenditures made by Class I railroads in the first half of the present year for new equipment and additions and betterments totaled \$468,305,000. This statement was made in a report submitted last Thursday by R. H. Aishton, chairman of the executive committee of the Association of Railway Executives, at a meeting of the advisory committee of the association at Atlantic City, N. J.

The capital expenditures for the first six months of 1930 were an increase of \$118,000,000 over those in the corresponding period of last year and were made up of \$187,486,000 for new equipment and \$280,819,000 for roadway structures.

Breaking the figures down, the report showed that capital expenditures for locomotives were \$41,251,000; freight cars, \$116,012,000; passenger cars, \$21,663,000; additional main track, yards and sidings, \$52,634,000; heavier rail, \$28,933,000; shops and engine houses, including machinery and tools, \$15,888,000; station facilities and office buildings, \$47,641,000; bridges, trestles and culverts, \$28,975,000; ballast, \$6,151,000; signals and interlockers, including telegraph and telephone lines, automatic train control, and other signal devices, \$20,023,000; other improvements, \$80,574,000.

Foundry Equipment Orders Much Lower

Orders of the Foundry Equipment Manufacturers' Association were only 85.2 in August, on the basis of 100 as the average monthly shipments in 1922-1924. This is the lowest level for several years, comparing with 90.6 in July and with 229.5 a year ago. A moving average for three months shows 92.6 for August. This compares with 110.2, the three-month moving average for machine tool orders.

Shipments in August were only 82.6, which is the lowest in several years. The comparison is with 116.1 in July and with 150.8 a year ago. Unfilled orders, at 140.2 at the end of August, showed slightly better than the 139.1 for July 31, but were far below the 441.1 of Aug. 31, 1929.

Scrap Institute Asks Aid of Mills on "Doctored" Cars

The cooperation of steel companies has been asked by the Institute of Scrap Iron and Steel in enforcing the code of business practices for the scrap iron industry. In a letter sent by Benjamin Schwartz, director general of the institute, to all steel mills, attention was called to the fact that complaints concerning "doctored" cars have been well cleaned up during the last two years, as the result of the organization of the institute, the acceptance by the Federal Trade Commission of the code, and the cooperation of the consumers of scrap.

Steel Exports Make Gain, While Imports Drop Further

WASHINGTON, Sept. 30.—Making the first gain since last March, exports of iron and steel products from the United States aggregated 151,235 gross tons, an increase of 19,463 tons over July. In contrast, imports in August, amounting to 35,387 tons, were the lowest since July, 1924, with a total of 30,410 tons.

Exports in August were 105,948 tons under the 257,183 tons exported in the same month of last year. For the first eight months outgoing shipments, totaling 1,508,008 tons, reflected a decline of 612,938 tons from the same period of last year.

Gains in exports in August, when compared with those in July, were made in three-fifths of the classifications. The only markets showing decreased receipts of American iron and steel were North and Central Amer-

ica, where the drop was slight. The greatest gain was in steel rails, which showed the largest total since April, 1929.

Canada, as usual, was the heaviest buyer of American iron and steel, taking 59,141 tons. Taking 12,124 tons, Chile was the largest market for rails in August.

While there were declines in imports from all the more important supplying countries, the decreases were especially marked in the cases of the United Kingdom, France and Sweden. The heaviest drop was in ferromanganese, which showed a decline of 2784 tons from July. Compared with August of last year, with a total of 84,506 tons, imports showed a drop of 49,119 tons, or 58 per cent. For the first eight months of 1930, incoming shipments, totaling 355,909

tons, were 169,428 tons below those in the corresponding period of 1929. Germany was the largest source of August imports, supplying 9864 tons, of which 2800 tons was sheets.

Of the 7771 tons of manganese ore imported in August, 2557 tons came from the Gold Coast of Africa, 2545 tons from Brazil and 1955 tons from Soviet Russia.

Edward G. Budd Mfg. Co., Philadelphia and Detroit, announces that its affiliated British concern, the Pressed Steel Co. of Great Britain, has received and is executing orders for two new-style, all-steel, single piece body models for two of the largest quantity production automobile manufacturers in England. These orders will increase the 1931 sales of the English company by approximately \$4,500,000.

Exports of Iron and Steel from the United States
(In Gross Tons)

	August		Eight Months Ended August	
	1930	1929	1930	1929
Pig iron.....	765	2,251	10,389	40,823
Ferromanganese.....	1,077	204	6,569	1,257
Scrap.....	18,607	62,857	311,783	364,293
Pig iron, ferroalloys and scrap.....	20,449	65,312	328,741	406,373
Ingots, blooms, billets, sheet bar.....	165	3,407	14,712	35,881
Skelp.....	7,925	14,962	72,791	82,733
Wire rods.....	3,179	2,969	31,296	31,852
Semi-finished steel.....	11,269	21,338	118,799	150,466
Steel bars.....	4,840	11,962	65,804	135,610
Alloy steel bars.....	291	449	5,211	12,395
Iron bars.....	338	118	1,341	4,039
Plates, iron and steel.....	6,799	13,924	76,309	140,895
Sheets, galvanized steel.....	5,219	11,079	64,971	109,123
Sheets, galvanized iron.....	566		4,711	
Sheets, black steel.....	6,537	16,147	81,299	129,732
Sheets, black iron.....	909	1,664	7,973	10,637
Hoops, bands, strip steel.....	2,196	4,759	30,841	52,488
Tin plate;terne plate.....	21,950	21,367	167,262	174,363
Structural shapes, plain material.....	10,294	21,639	101,392	196,507
Structural material, fabricated.....	8,553	12,638	72,243	77,575
Tanks, steel.....	3,097		12,565	
Steel rails.....	18,298	12,926	81,344	105,317
Rail fastenings, switches, frogs, etc.....	2,409	2,851	14,604	22,999
Boiler tubes.....	929	1,391	11,030	12,723
Casing and oil-line pipe.....	4,157	7,847	49,160	87,128
Pipe, black and galvanized, welded steel.....	7,985		61,193	
Pipe, black and galvanized, welded iron.....	1,258	11,497	11,885	95,161
Plain wire.....	1,708	2,983	19,106	32,701
Barbed wire and woven wire fencing.....	2,127	4,001	23,311	45,384
Wire cloth and screening.....	214	148	1,240	1,175
Wire rope.....	306	576	3,320	5,233
Wire nails.....	816	733	5,476	9,367
Other nails and tacks.....	459	872	4,295	7,930
Horseshoes.....	67	32	134	252
Bolts, nuts, rivets and washers, except track.....	758	1,589	7,604	10,948
Rolled and finished steel.....	113,070	163,192	990,624	1,479,682
Cast iron pipe and fittings.....	1,854	1,732	23,340	22,510
Malleable iron screwed fittings.....	715	833	7,823	8,259
Car wheels and axles.....	1,047	1,104	10,337	15,216
Iron castings.....	417	442	5,066	8,422
Steel castings.....	845	868	7,545	8,133
Forgings.....	712	964	6,512	9,216
Castings and forgings.....	5,590	5,943	60,623	71,756
All other.....	857	1,398	9,221	12,669
Total.....	151,235	257,183	1,508,008	2,120,946

Imports of Iron and Steel Products into the United States
(In Gross Tons)

	August		Eight Months Ended August	
	1930	1929	1930	1929
Pig iron.....	8,747			
Sponge iron.....		12,377	80,056	92,581
Ferromanganese and spiegeleisen.....	2,236	9,021	37,905	58,061
Ferrochrome.....		92	162	474
Ferrosilicon.....	84	1,124	3,886	6,340
Other ferroalloys.....	45		285	
Scrap.....	1,511	12,033	17,240	64,407
Pig iron, ferroalloys and scrap.....	12,623	34,647	139,534	221,863
Steel ingots, blooms, billets, etc.....	1,295	2,639	12,079	18,541
Wire rods.....	317	1,369	6,499	11,207
Semi-finished steel.....	1,612	4,008	18,578	29,748
Concrete reinforcement bars.....	1,747			
Hollow bar and drill steel.....	126	3,778	26,412	25,259
Merchant steel bars.....	2,704			
Iron bars.....	49			
Iron slabs.....	2	175	803	2,285
Boiler and other plate.....	5	362	1,792	2,818
Sheets, skelp and saw plate.....	2,927	3,090	19,138	16,338
Tin plate.....	24	35	149	208
Structural shapes.....	5,297	15,695	93,818	103,115
Sheet piling.....	2,139	1,517	4,991	5,644
Rails and rail fastenings.....	1,145	2,866	14,918	28,114
Welded pipe.....	1,489			
Other pipe.....	461	727	3,194	4,269
Barbed wire.....	297	322	3,414	4,078
Round iron and steel wire.....				
Telegraph and telephone wire.....	19	3	43	3
Flat wire and strip steel.....	60	224	852	1,464
Wire rope and strand.....	145	175	1,768	1,686
Other wire.....	34	19	240	385
Hoops and bands.....	1,734	7,224	13,427	28,757
Nails, tacks and staples.....	636	993	3,564	6,537
Bolts, nuts and rivets.....	12	62	256	227
Horse and mule shoes.....	2	13	10	25
Rolled and finished steel.....	21,054	37,280	188,789	231,212
Cast iron pipe and fittings.....	28	8,397	7,920	41,054
Castings and forgings.....	70	174	1,088	1,460
Total.....	35,387	84,506	355,909	625,337
Manganese ore.....	7,771	32,983	202,100	247,045
Iron ore.....	178,171	298,013	2,123,316	2,067,207
Magnesite (dead burned).....	3,563	7,517	23,772	19,623

*Manganese content only.

†Chromium content only.

‡Silicon content only.

PERSONALS

DR. A. S. McALLISTER, an electrical engineer with the United States Bureau of Standards since 1921, has been appointed assistant director in charge of commercial standardization.

FREDERIC M. KREINER, who has been identified with Manning, Maxwell & Moore, Inc., New York, since 1903, has been elected vice-president. He will continue as treasurer of the company, which position he has held since 1920.

DR. C. H. HERTY, JR., supervising chemist in the metallurgical section of the United States Bureau of Mines Experiment Station, Pittsburgh, is to address the Cincinnati chapter of the American Society for Steel Treating, Oct. 2, on "Inclusions in Steel."

L. B. MEAD, for the last two years Indianapolis manager for the Westinghouse Electric & Mfg. Co., East Pittsburgh, has been appointed assistant industrial manager in the Northwest district for that company, with headquarters in Chicago. He went with the Westinghouse company in 1921 and served it continuously in various capacities before going to Indianapolis. WILLIAM J. MORGAN, who has been associated with the Indianapolis office of the Westinghouse company since 1921, succeeds Mr. Mead as manager in that city.

M. M. AUSTIN, research engineer, Fansteel Products Co., Inc., Chicago, is to address the Western Society of Engineers, Chicago, Oct. 2, on "Metals and Alloys for Special Uses."

W. R. JUDSON, Chilean representative of Allis-Chalmers Mfg. Co., Milwaukee, for 13 years, has been appointed managing director of Allis-Chalmers (France), controlling office for all Europe and northern Africa, and will leave Oct. 15 for Paris to assume his new duties. He succeeds H. I. KEEN, who retires after being associated with the company for 25 years, 15 of which were in charge of the Paris office. ERLING WINSNES, for six years representative in Bolivia, has been appointed to succeed Mr. Judson in Chile.

F. MAURICE, commercial manager of Société Genevoise d'Instruments de Physique, Geneva, Switzerland, has arrived in the United States for a stay of about six weeks. During this time he will visit the plants of various machine tool builders in the West and New England and some automobile plants in Detroit.

THOMAS WOODS, assistant to the president of the Carnegie Steel Co.,

Pittsburgh, has been made a director of that company to fill a vacancy on the board caused by the resignation of JOHN S. OURSLER, recently vice-president.

C. F. SPINNING, 201 State Theatre Building, Pittsburgh, manufacturers' representative, has been appointed district representative at Pittsburgh for Doelger & Kirsten, Milwaukee, maker of Milwaukee shears.

ARTHUR S. CUMMINGS has been appointed sales promotion and advertising manager of the American Mono-Rail Co., Cleveland.

DAN B. MOORE has resigned, because of ill health, as superintendent of the Kewanee Boiler Corporation, Kewanee, Ill. He has been with the company since its organization, having started as an office boy. He has been succeeded as superintendent by ROY POWERS.

M. C. PETERSON, formerly a salesman with the L. S. Starrett Co., has joined the sales organization of Wachs, Gregg & Co., Chicago, dealers in machine tools.

HENRY D. SHARPE, president, Brown & Sharpe Mfg. Co., has been reappointed chairman of the committee on foreign commerce of the Chamber of Commerce of the United States.

HENRY BREWER, vice-president and secretary, Winchester Repeating Arms Co., and LESLIE H. THOMPSON, vice-president and treasurer, have resigned and have been succeeded as vice-presidents by EDWARD PUGSLEY, factory superintendent, and CLIFFORD R. BABSON, director of sales. Mr. Thompson will remain as a member of the board. THOMAS C. JOHNSON, product engineer, also has been made a vice-president, RICHARD D. JACK, treasurer, and ARTHUR E. HODGSON, secretary.

M. J. CZARNIECKI has been appointed manager of tubular sales for the A. M. Byers Co., Pittsburgh, according to an announcement by H. W. Rinearson, vice-president. The appointment is in line with departmentalizing sales activities, which has been necessitated by the program of the Byers company to broaden the markets for wrought iron in forms other than pipe. Mr. Czarniecki joined the Pittsburgh sales organization of the Byers company in 1913, and the following year was assigned to the New York office, where he remained until he was transferred to Chicago in 1915. Following the war, he returned to Chicago as district

manager, and the next year was appointed to a similar position in the New York district. In 1925 he became assistant general manager of sales with headquarters at Pittsburgh.

PROF. ELIHU THOMSON, head of the Thomson research laboratory of the General Electric Co., Lynn, Mass., on Sept. 27 was tendered a dinner at the New Ocean House, Swampscott, Mass., in recognition of his completion of 50 years of service to the industry. Approximately 700 were present.

D. H. MILLER, for several years identified with the sales department of the Pittsburgh Crucible Steel Co., Pittsburgh, has become associated with the Hausman & Wimmer Co., Pittsburgh, and will have charge of sales of billets, slabs and sheets.

W. G. McFADDEN has been appointed Detroit manager for the West Leechburg Steel Co., Pittsburgh, succeeding M. F. FINDLEY, who was made general sales manager of the company during the summer. Mr. McFadden has been identified with the company's Detroit sales organization for about five years. WILLIAM R. KUHN, recently New England district manager, has been made Pittsburgh district sales manager. He has been succeeded at Hartford by R. J. SWAN, who has been assistant district manager at Chicago in recent years. Mr. Swan's place at Chicago has been taken by NORMAN H. HALLS, who had recently been identified with the General Fireproofing Co. at St. Louis.

HUBERT ALAN SPENCE THOMAS, of the Melingriffith tin plate works near Cardiff, Wales, is spending several months in the United States and Canada.

Republic Steel Creates Six Sales Divisions

General sales headquarters of Republic Steel Corporation under Norris J. Clarke, recently named vice-president in charge of sales, will consist of six sales divisions. J. M. Schlendorf continues as manager of sales alloy division; W. F. Vosmer as manager of sales bar division, and J. E. Holmes as manager of sales pipe division. C. E. Hilkert, in addition to being manager of sales of by-products, becomes manager of sales of pig iron. A. R. Johnson, formerly manager of sales of tin plate, becomes manager of sales of sheet and tin plate division, and F. H. Loomis, formerly assistant manager of sales of mild steel products, is made sales manager of the strip division.

Sales headquarters for all divisions

will be at Youngstown, except the alloy division, which will be at Massillon, Ohio.

F. C. Young, general manager of sales of the Union Drawn Steel Co., subsidiary, will move his headquarters from Youngstown to Beaver Falls, and J. S. Langston, sales manager of the die rolling division, will move his headquarters from Youngstown to Buffalo.

Morgan Engineering Co. to Be Reorganized

The Morgan Engineering Co., Alliance, Ohio, will vote on a plan of reorganization at a special meeting of the stockholders Oct. 21. The plan to be submitted has been approved by the reorganization committee representing both preferred and common stockholders and also by the creditors' committee. Considerable reduction in the debts and bonds of the company have been made since it was placed in the hands of a creditors' committee in 1926. Under the proposed reorganization plan, holders of 8 per cent preferred stock will receive two shares of the new no par accumulated Class A stock and one share of Class B stock, the latter being in lieu of back dividends. Holders of common stock will receive three shares of no par common for each present share.

Pig Iron and Steel Output in Canada at New Low

TORONTO, Sept. 30.—August production of pig iron, at 57,459 gross tons, was the lowest for any month this year, and was 11 per cent under the 64,676 tons reported for July, and only about half the total of 112,528 tons produced in August, 1929. During the month the output of basic iron fell to 36,067 tons from 42,498 tons in July; foundry iron dropped to 14,114 tons from 22,178 tons in July. Malleable iron totaled 7278 tons against none in the previous month.

There was no change in blast furnaces during the month. Five stacks were blowing at the close, as follows: Steel Co. of Canada, Ltd., Hamilton, Ont., two; Algoma Steel Corp., Sault Ste. Marie, Ont., one; Canadian Furnace Co., Port Colborne, Ont., one, and Dominion Iron & Steel Co., Sydney, N. S., one.

For the eight months ended with August, the production of pig iron was 573,321 tons, a decline of 22 per cent from the 730,871 tons made during the corresponding eight months of last year, which in turn was 12 per cent over the 654,957 tons reported for the same period of 1928.

Output of ferroalloys in August amounted to 3397 tons, a slight increase over the 3334 tons produced in July. For the year to Aug. 31 the total was 51,691 tons, compared with 56,679 tons in the first eight months of last year.

The output of steel ingots and direct steel castings in August, at 57,626 tons, was the lowest for any

month this year, being 16 per cent under the preceding low, 68,424 tons, reported for July, and less than half the total of 120,282 tons made in August, 1929.

For the eight months the production of steel ingots and castings, at 755,043 tons, was 24 per cent less than the 988,951 tons made in the corresponding period of last year.

The Dominion Bureau of Statistics index number on iron and steel and its products declined fractionally from 91.3 in July to 91.2 in August.

U. S. Steel Takes Over Oil Well Supply Co.

The United States Steel Corp. announced Tuesday that it had taken over the properties, assets and business of the Oil Well Supply Co., Pittsburgh. The consideration is 108,402 shares of common stock of United States Steel, which on the day of the actual transfer were worth approximately \$16,800,000. The title was transferred from the Oil Well Supply Co., a Pennsylvania corporation, to the Oil Well Supply, a New Jersey corporation. The official announcement said:

"The acquirement of the properties and business of the old Oil Well Supply Co. furnishes the United States Steel Corp. with an established organization operating in the United States and abroad as a medium for the distribution direct to consumers and under the special conditions attaching to the development of oil and gas properties of a large quantity of the corporation's production of steel pipe, wire rope and other of its products used in the oil and gas fields. In addition, the Oil Well Supply Co. merchandises a complete line of equipment and machinery of its own manufacture used in the oil and gas fields and is also the distributor of similar production of other manufacturers.

"The personnel of the executive, administrative and operating organization of the old Oil Well Supply Co. will continue in substantially similar capacities in the new Oil Well Supply Co."

Iron Highway in Illinois Is Completed

A new roadway in Sangamon County, Ill., the first to be built with an iron base and curb, has been completed. Construction was started on Sept. 15. Iron plates rolled by the American Rolling Mill Co. at Middletown, Ohio, were put down on the rolled and leveled sub-grade and these plates were covered with a mastic sand cushion and a brick surface.

The National Paving Brick Manufacturers Association cooperated with the Poston-Springfield Brick Co. and the American Rolling Mill Co. in the test which was supervised by the Illinois State and county highway departments.

This new roadway is the first test

of three designs, and if any of them are successful in actual service it will mean large tonnages for the iron and steel mills of the country.

The idea of highways in which iron and steel will be important materials is believed to have first been suggested by Bennett Chapple, vice-president of the American Rolling Mill Co., in an address before the International Acetylene Association, November, 1929.

Obituary

WALTER B. EICHLEY, secretary and treasurer of the John Eichley, Jr., Co., Pittsburgh, died at the Homeopathic Hospital in that city on Sept. 26, aged 52 years. He had been identified with his father and brothers in the construction firm bearing the family name, during his entire business career.

WILLIAM D. BALDWIN, chairman of the board of the Otis Elevator Co., of which he had been president for many years, died suddenly at his home at Yorktown Heights, N. Y., Sept. 26, aged 74 years. He obtained his first business experience with D. M. Osborne & Co., Auburn, maker of farm machinery, and represented the firm in Europe for five years. He left Osborne & Co. in 1882 to engage in the manufacture of elevators and later bought an interest in Otis Brothers & Co., which later became the Otis Elevator Co.

FRANK J. ADELSBERGER, president of the Hummel Boiler Mfg. Co., St. Louis, died at his home there on Sept. 24 of heart disease. Before joining the Hummel company a year ago he was associated with the Southern Coal, Coke & Mining Co. He was 49 years old.

EDWARD W. HYDE, former president of the Bath Iron Works, Bath, Me., and one of the founders of the Hyde Windlass Co., of that city, died on Sept. 25 in a private hospital in Providence, R. I. He was in his sixty-third year.

WILLIAM H. BOYD, who until recently was production manager of the Westfield Mfg. Co., Westfield, Mass., died at his home in that city on Sept. 24, following a long illness.

WEBSTER L. MARBLE, founder of the Marble Arms & Mfg. Co., Gladstone, Mich., died Sept. 22, following a short illness. During the World War his company made over a million rifle sights for the Allies.

JAMES E. EVANS, in charge of city sales for the S. Obermayer Co., Chicago, recently died following a brief illness. He was born in London, England, 70 years ago and had served the Obermayer company for 40 years.

Some Improvement in Buying of Machine Tools

American Locomotive Co.
Places Orders For About
\$100,000 Worth of New Equipment

REPORTS from leading centers point to a moderate gain in machine tool bookings during the past week. Business has been featured by orders from the American Locomotive Co. for about \$100,000 worth of tools, following purchases of a similar amount recently

for this company's subsidiary, the McIntosh & Seymour Corporation, Auburn, N. Y. All of the new equipment is to be used to carry out a program of plant rehabilitation.

In the New York district some of the machine tool selling agencies have had the best week's business in some

time. It is significant that orders are now being closed with less delay.

While there is nothing to indicate a very active demand for shop equipment over the remainder of the year, it is likely that September will mark the beginning of an upturn, which, however, may be slow in maturing.

New York

The American Locomotive Co. has placed orders for about \$100,000 worth of machine tools for its plant at Schenectady, N. Y., following purchases of approximately an equal amount a few weeks ago by this company for its subsidiary, the McIntosh & Seymour Corporation, Auburn, N. Y. These purchases are for the purpose of carrying out a program of plant rehabilitation recently decided upon by the American Locomotive Co. and are not indicative of any immediate improvement in the buying of locomotives by the railroads.

Influenced somewhat by this business, but also by the fact that orders from other sources have been larger, some of the local machine tool selling agencies have had the best week's business in months. One firm, in fact, has had its best week of the year. Prospects are more numerous, and less time is now being taken in some cases for manufacturers to come to a decision regarding equipment purchases. A Brooklyn company bought five machines, and orders of this size have not been common lately.

Cleveland

Dealers report a slight improvement in the machine tool market. While inquiry has been a little better for a few weeks, it was not until the past week that dealers' sales showed any gain. There are no lots of machinery of any size out for quotations, although single tool inquiries are holding up fairly well. September sales by some dealers were slightly more than those in August. However, some machine tool builders did less business in September than

in the previous month. There is nothing at present to indicate a very active demand during the remainder of the year. Some small-lot business is being placed by Detroit automobile manufacturers, but no extensive buying is expected from that source this fall, and railroads are buying practically no equipment.

Chicago

Sales of machine tools, after having been comparatively quiet for a week, have again become more active, and September purchases give promise of registering a gain over those of the previous month. Buyers' wants vary over a wide range, and individual requests for prices are usually for only one or two machines. A significant fact is that fresh inquiries are being closed faster than heretofore. The same, however, cannot be said of old inquiries, most of which still appear to be alive, but many give little prospect of swelling dealers' books in the near future. The A. O. Smith Corp., Milwaukee, is holding back a list on which it has taken prices, and the Chicago Board of Education appears to be in no hurry to make purchases. That jobbing shops are bidding on more work is shown by the fact that they issue quite a few inquiries for machine tools on which orders are contingent on their obtaining certain contracts for machine work.

Milwaukee

The fact that some machine tool manufacturers are recalling numerous employees laid off during the summer lull is regarded as among the most favorable developments of the past week. The report, generally, is

that improvement is going on, both as to inquiry and actual orders. Sources of new business cover a wide variety of industry, and include some shops supplying automobile plants with units and parts. The majority of purchases embrace one or two items and are largely for replacement. Prospects for October are believed to be promising.

Pittsburgh

The trend of the machinery market has been rather mixed in the last week, with several dealers reporting a better-than-ordinary volume of business and others reflecting little activity. Aggregate orders booked by nearly all representatives in this territory are well ahead of August, but that was an extremely poor month, and the improvement in September has not been as definite as might be wished.

New inquiry is coming out in fair volume, and several projects have been revived since the first of the month which were indefinitely delayed earlier in the year. Sizable industrial lists are lacking, and scarcely any railroad buying is reported. The larger steel companies in the district are placing some business and taking estimates on a fair volume of special tools.

Cincinnati

Machine tool manufacturers in this district report that orders are relatively scarce and represent immediate needs. Inquiry, which has been fluctuating for some time, also slackened the past week. Production continues in keeping with the low demand and no change in schedules is anticipated.

New York

SUPERSTRUCTURE will soon be started for a new super-phosphate plant near Tampa, Fla., for American Cyanamid Co., 535 Fifth Avenue, New York, where work has been under way on a dock and shipping terminal. Initial plant will include power house, machine shop and other mechanical departments, and will cost over \$3,000,000. Project will include storage facilities, conveying and other equipment for distribution of raw phosphate rock.

R. H. Macy & Co., Thirty-fourth Street and Broadway, New York, department store, have awarded general contract to Herbert E. Mitler, Inc., 505 Fifth Avenue, for a one-story automobile service, repair and garage building, 153 x 256 ft., in connection with new storage and distributing terminal at Brooklyn, to cost about \$180,000 with equipment. Robert D. Kohn, Inc., 56 West Forty-fifth Street, New York, is architect.

Board of Education, Park Avenue and Fifty-ninth Street, New York, is considering erection of boys' new vocational school at Sixty-fifth Street and Eighth Avenue, Brooklyn, where site has been purchased, similar to proposed Samuel Gompers Industrial High School for Boys in Bronx for which plans have been drawn. It will cost about \$1,660,000 with equipment. Dr. Joseph M. Sheehan is associate superintendent in charge of industrial education. W. C. Martin, Flatbush Avenue Extension and Concord Street, Brooklyn, is architect for board.

Abraham Slavin, 2690 University Avenue, Bronx, New York, architect and

engineer, has plans for a one-story automobile service, repair and garage building, 50 x 200 ft., to cost over \$100,000 with equipment.

Irving Block & Die Co., 132 Greene Street, New York, has leased two floors at 7-9 West Thirty-sixth Street for expansion, and will remove to new location.

Ovens, power equipment, conveying and other machinery will be installed in new plant, 60 x 260 ft., to be built by Dugan Brothers, Inc., 290 South Fifth Street, Brooklyn, baker, at White Plains, N. Y., including automobile service and garage unit, to cost \$150,000 with equipment. Henry Holder, 242 Franklin Avenue, Brooklyn, is architect.

Anheuser-Busch, Inc., 721 Pestlozzi Street, St. Louis, manufacturer of beverages, is contemplating purchase of property near New Brunswick, N. J., for new plant for manufacture of containers and cartons, etc., to cost over \$500,000 with machinery.

National Lock Washer Co., 40 Hermon Street, Newark, manufacturer of washers, metal window equipment for railroad cars, marine speedometers, drop forgings, etc., is completing new four-story plant and will concentrate production of all departments in new unit, which will be ready for service before close of year.

Consolidated Film Industries, Inc., Lemoine Avenue, Fort Lee, N. J., has awarded general contract to R. J. Walsh Co., 420 Lexington Avenue, New York, for one-story machine shop, 25 x

240 ft., and one-story storage and distributing building, 25 x 200 ft., to cost about \$70,000 with equipment. Granville W. Dexter, 201 Main Street, Fort Lee, is architect.

General Brass Foundry, Inc., Irvington, N. J., organized by Joseph B. Maler, Newark, and associates, has taken title to property of Sweet Foundry, Irvington, totaling 5000 sq. ft. floor space, for new plant for manufacture of non-ferrous castings.

Harbor Tank Storage Co., Inc., 11 West Forty-second Street, New York, a subsidiary of New York Tank Barge Co., same address, has acquired plant of Lever Brothers Co., Cambridge, Mass., soaps, oils, etc., at Edgewater, N. J., including storage and barging facilities, for new tank storage and distributing unit for oils, food products, etc., to be operated in conjunction with present plants at Weehawken and Guttenburg, N. J.

Board of City Commissioners, Perth Amboy, N. J., is considering extensions and improvements in municipal electric light and power plant, including additional equipment. Dr. John V. Smith is commissioner of public works, in charge.

Barnett Foundry & Machine Co., 536 Lyons Avenue, Irvington, N. J., has contracted with Contra-Flo Co., Ltd., London, England, for manufacturing and sales rights in United States of pumping equipment, feed regulators and other kindred machinery as produced in England, and will arrange part of plant output for new line.

INDUSTRIAL ACTIVITY

Prospects Revealed by a Survey of Construction Projects

CONSTRUCTION projects throughout the country, requiring machinery and other equipment reached a total last week in excess of \$86,000,000, of which \$67,000,000 is represented by bond issues of public utility and power companies, the greater part of which will be expended for improvement and expansion of present facilities.

Industrial construction projects total more than \$12,000,000, of which plans of metal-working plants contribute about \$3,000,000, or 25 per cent. Oil company developments total \$2,500,000, including a storage plant in Atlanta, Ga., a refinery addition in Colorado, Tex., and a refinery near Cincinnati, the last mentioned to cost \$1,500,000. Vocational schools in New York, Texas, Maine, Arkansas, Michigan and California reach a total of \$4,000,000 and include two large schools, one in New York to cost \$1,660,000 and a \$1,000,000 manual training school in San Antonio, Tex.

Among the larger industrial construction pro-

jects are a \$3,000,000 coal breaker for the Philadelphia & Reading Coal & Iron Co. at St. Nicholas, Pa., a \$3,000,000 super-phosphate plant near Tampa, Fla., and a \$1,500,000 installation of air-conditioning equipment at the A. O. Smith Corp. plant in Milwaukee.

Projected construction by metal-working plants includes a plant addition by the St. Louis Screw & Bolt Co. to cost \$250,000, a \$60,000 plant for the Welded Products Corporation in Kansas City, Mo., a \$100,000 plant for a zinc products manufacturer at Fort Smith, Ark., and a \$200,000 addition to the plant of the Niagara Falls Smelting & Refining Corp., Buffalo.

Grain operators appear in the industrial construction field with a \$750,000 grain elevator at Louisville, Ky., and a \$200,000 grain milling plant at Springfield, Ore., a \$100,000 plant for a cereal manufacturer at Lockport, Ill., and a \$160,000 plant for a baking company at Sioux City, Ia.

New England

CONTRACT has been let by Crown Sheet Metal Works, 52 Prest Street, New London, Conn., to Oliver Woodworth Co., 36 Pearl Street, for one-story addition, 36 x 40 ft., to cost about \$18,000.

Commercial Instrument Corporation, Meriden, Conn., operating Tiffany Mfg. Co., and Connecticut Telephone & Electric Co., manufacturer of electrical products, telephone apparatus, etc., with local plant, is arranging for removal of another subsidiary, American Paulin System, Inc., Los Angeles, manufacturer of precision instruments, altimeters, etc., to Meriden, where part of local plant will be given over to such line of output. Company also operates John P. Marsh Co., and Sargent Co., both with plants at Chicago, and Carl A. Norgren Co., Denver.

Public Service Co. of New Hampshire, Manchester, is disposing of a bond issue of \$5,279,000, part of proceeds to be used for expansion and improvements in plants and system.

Southern New England Ice Corporation, Corbin Place, New Britain, Conn., is considering a new artificial ice-manufacturing plant to cost over \$100,000 with machinery. Improvements will also be made in present plant.

United States Cast Magnet Steel Corporation, Lawrence, Mass., recently organized by interests connected with Lawrence Factories, Inc., will occupy part of former local textile plant of Everett Mills, Inc., for production of cast cobalt steel products.

Board of Education, Lewiston, Me., plans installation of manual training equipment in new three-story high school, 133 x 278 ft., to cost about \$300,000, for which Coombs & Harriman, 11 Lisbon Street, architects, are completing plans.

Cumberland County Power & Light Co., Portland, Me., has secured permission to acquire electric power properties, including undeveloped water power sites of Clark Power Co., a subsidiary of Pepperell Mfg. Co., Biddeford, Me., for price of \$2,300,000, and will consolidate with organization. Purchasing company plans expansion, including transmission lines.

G. E. Haynes, 29 George Street, Pittsfield, Mass., architect, has plans for a three-story automobile service, repair and garage building, 100 x 125 ft., to cost about \$120,000 with equipment.

State of Connecticut has plans for State school for boys at Meriden, to contain vocational shops.

Boston & Maine Railroad, Boston, will make improvements at its Worcester shops, including a locomotive washing plant. Fan equipment is required.

Concannon Shear Co., Danbury, Conn., is contemplating erection of a new plant, 40 x 150 ft.

South Atlantic

FOLLOWING recent purchase of W. J. Loth Stove Co., Waynesboro, Va., by General Electric Realty Corporation, 120 Broadway, New York, a subsidiary of General Electric Co., Schenectady, plant will be taken over by Edison Electric Appliance Co., 5600 West Taylor Street, Chicago, manufacturer of electric heating appliances, etc., and will be operated as branch, with expansion in output. Edison Electric company is a subsidiary of General Electric Co.

City Baking Co., 308-24 North Gay

Street, Baltimore, has awarded general contract to Consolidated Engineering Co., 20 East Franklin Street, for a one-story automobile service, repair and garage building, 105 x 205 ft., to cost over \$100,000 with equipment.

Board of District Commissioners, District Building, Washington, is asking bids until Oct. 15 for a quantity of water meters.

Bureau of Yards and Docks, Navy Department, Washington, is asking bids (no closing date stated) for a 150-ft. steel radio tower for naval radio station at Jupiter, Fla.; until Oct. 8 for dismantling and reerecting three steel hangars, each about 66 x 140 ft., and for two 100-ft. radio towers for naval station at Quantico, Va.

Metallic Casket Co., Atlanta, Ga., has awarded general contract to Flagler Co., Red Rock Building, for two-story storage and distributing plant, 45 x 145 ft., to cost about \$40,000 with equipment.

Gulf Coast Airways, Inc., Atlanta, Ga., is planning an addition, 80 x 110 ft., to hangar at Candler Field, including additional repair facilities.

Gastonia Belting Co., Gastonia, N. C., manufacturer of mechanical belting, is carrying out expansion program, including installation of additional equipment.

B. C. Goodwin, Clifton Forge, Va., and associates have organized Clifton Forge Machine & Foundry Co., with capital of \$100,000, and plan operation of local foundry, machine and mechanical works.

Seaboard Public Service Co., Salisbury, Md., operating electric light and power properties in Maryland, Delaware, Virginia, North Carolina, Georgia and other States, has disposed of a preferred stock issue to total \$4,700,000, part of fund to be used for extensions and improvements, including transmission lines.

Standard Oil Co., 746 Marietta Street, Atlanta, Ga., has awarded general contract to Flagler Co., Red Rock Building, for one-story addition to oil storage and distributing plant, to cost about \$40,000 with equipment. Company engineering department is in charge.

Buffalo

COMMON COUNCIL, Buffalo, has authorized call for bids on general contract for new municipal marine airport, consisting of hangar with repair facilities, administration building, and other structures, to cost about \$100,000 with equipment. Bids recently received have been rejected. George F. Fisk, commissioner of public works, is in charge.

Skelton Shovel Co., Dunkirk, N. Y., recently acquired by American Fork & Hoe Co., Keith Building, Cleveland, has work under way on one-story addition, to cost about \$55,000 with equipment. It will be used primarily as a machine shop; other departments will also be expanded.

Niagara Hudson Power Corporation, Electric Building, Buffalo, operating Buffalo General Electric Co., and other utilities, is considering construction of a new hydroelectric generating plant at junction of Hudson and Sacandaga rivers, near Hadley, N. Y., to cost over \$1,500,000 with power transmission system.

U. S. L. Battery Corporation, Highland Avenue, Niagara Falls, N. Y., manufacturer of electric storage batteries, electric arc welders, etc., plans rebuilding part of works recently destroyed by fire,

with loss over \$30,000. Company is a subsidiary of Electric Auto-Lite Co., Toledo, Ohio.

Burnover Stove Corporation, Jamestown, N. Y., care of Roy E. Ulrich, 89 Fairmount Avenue, recently organized by Mr. Ulrich and associates with capital of \$100,000, has arranged for purchase of former local plant of Roberts Machine & Iron Works, 174 Hopkins Avenue, and will remodel for manufacture of gas heating stoves, including parts and assembling. Edward G. Sterling, 421 Murray Avenue, is also interested in company.

Stanley A. Nelson, Gowanda, N. Y., and associates have organized Gowanda Furnaces, Inc., with capital of \$25,000, and plan operation of local plant for production of furnaces, stoves and other heating apparatus. David Bliss, Gowanda, will be an official of new company.

Loco Light Co. of Indianapolis has been purchased by Star Headlight & Lantern Co., 5 Prospect Street, Rochester, N. Y., and business will be transferred to Rochester. Loco Light Co. manufactures steam-driven turbo-generators for locomotives.

Niagara Falls Smelting & Refining Corp., Buffalo, has under way an addition, 50 x 200 ft., to cost about \$200,000 including equipment.

Philadelphia

PART of No. 1 mill of Cleveland Worsted Mills Co., Allegheny Avenue and Emerald Street, Philadelphia, totaling about 12,000 sq. ft., has been leased by American Tin & Terne Plate Co., Twenty-fourth and Vine Streets, for storage and distribution.

Hawber Mfg. Co., Philadelphia, care of Frank A. Moorshead, Lansdowne, Pa., recently organized by Mr. Moorshead and associates, plans operation of local plant for production of metal stampings, turnings, etc. H. F. Potter, Upper Darby, Pa., and Roland Fleer, Narberth, Pa., are interested in new company.

Philadelphia Barrel Works, Philadelphia, has leased building at 1036-38 North Fourth Street, for new plant for wire-bound kegs, barrels, etc.

C. A. Godshalk, 139 Valley Road, Ardmore, Pa., and associates have organized Godshalk Co., with capital of \$225,000, to operate a plant at Philadelphia for manufacture of electrical and mechanical products, as well as metal fabricated specialties.

Atlantic City Gas Co., Atlantic City, N. J., will dispose of bonds totaling \$698,000, and preferred stock for \$174,000, part of fund to be used for expansion and improvements.

Kent Automatic Parking Garage, Inc., 209 East Forty-third Street, New York, has awarded general contract to Donald M. Love, Inc., Juniper and Walnut Streets, Philadelphia, for a twenty-six story automobile service, repair and garage building on Fifteenth Street, to be operated as Kent Philadelphia Garage, to cost over \$2,000,000 with equipment.

Liquid Carbonic Corporation, 3112 South Kedzie Avenue, Chicago, has acquired plant and business of Keystone Carbonic Gas Co., Highspire, Pa., and will operate as branch plant.

Philadelphia & Reading Coal & Iron Co., Reading Terminal, Philadelphia, is considering construction of new central electric-operated coal breaker at St. Nicholas, Pa., to handle output of nine

coal mines, to cost over \$3,000,000 with machinery.

S. V. Reeve, Twenty-first and Hayes Streets, Camden, N. J., manufacturer of stoves, boilers, parts, etc., is planning to rebuild part of foundry destroyed by fire Sept. 25.

Lycoming Paper Box Co., Williamsport, Pa., recently organized by Robert L. Leinbach, 155 East Fourth Street, and associates, plans operation of local factory for manufacture of paper boxes and containers, also combination paper and metal receptacles. V. A. L. Ertel, Williamsport, is identified with new company.

Philadelphia Hardware & Malleable Iron Works, Inc., has removed its offices to State Road and Shelmire Street, Tacony, Philadelphia.

Detroit

BIDS will be asked in about 30 days by City Council, Wyandotte, for municipal electric light and power plant, to cost about \$300,000 with machinery. Froehlich & Emery Engineering Co., Second National Bank Building, Toledo, Ohio, is engineer.

Seneca Copper Co., Calumet, Mich., is planning early expansion and betterments at No. 1 shaft, including erection of new rock house, installation of electric pumping machinery, air compressors and other equipment.

United States Tool & Mfg. Co., Dearborn, Mich., recently organized by Cyril E. Bailey, 2520 Lakewood Street, Detroit, and associates, plans operation of plant for manufacture of tools, machine equipment and other specialties. Simon F. Wall and Allan M. Thompson, both of Detroit, are interested in new company.

Superior Block Co., Lansing, Mich., has arranged for a new line of production in connection with a lock-joint cast-iron, and will develop capacity for parts and assembling.

Board of Education, Detroit, is considering installation of manual training equipment in first unit of new Chadsey High School to cost about \$950,000, for which plans are being drawn by N. Chester Sorenson Co., 2231 Park Avenue, architect.

Modell Friedman Steel Corp., 1205 Beaufait Street, Detroit, has arranged for an increase in capital from \$50,000 to \$100,000 for general expansion.

Pittsburgh

FOLLOWING recent acquisition of Paragon Refining Co., Cincinnati, Gulf Refining Co., Frick Annex, Pittsburgh, is considering erection of new oil refinery near Cincinnati, to cost close to \$1,500,000 with machinery.

K. Simon, 160 Fullerton Street, Pittsburgh, manufacturer of automobile bodies, wagons, etc., has awarded general contract to Harry Dunn, 1014 Locust Street, for a two-story and basement addition, 45 x 65 ft., to cost about \$35,000 with equipment.

Lansberry Hardware Co., Philipsburg, Pa., is planning to rebuild two-story storage and distributing plant destroyed by fire Sept. 23, with loss reported over \$150,000 including equipment.

Charles H. Hays, Jr., North East, Pa., and associates have organized Eureka Electrical Products Co., with capital of \$50,000, and will operate local plant for

manufacture of electrical specialties, mechanical novelties, parts, etc. Charles H. Hays, Sr., will be president and Mr. Hays, Jr., treasurer.

West Virginia Rail Co., Huntington, W. Va., has approved plans for a new unit, to be known as mill No. 2, consisting of main building, 100 x 600 ft., with four bays, two 80 x 250 ft., each, 80 x 370 ft., and 60 x 160 ft. All machinery will be electric-driven and present plant will be completely electrified. Several electric traveling cranes will be installed. Entire expansion will cost about \$235,000. H. A. Zeller is vice-president.

George & Sherrard Paper Co., Wellsburg, W. Va., a subsidiary of International Paper Co., 220 East Forty-second Street, New York, manufacturer of heavy paper bags and containers for cement, plaster, etc., contemplates construction of new branch mill near Los Angeles, to cost over \$100,000.

Reed Electrical Mfg. Co., Pittsburgh, care of C. H. Fleming, 808 Baird Street, Elizabeth, Pa., recently formed by Mr. Fleming and associates, plans operation of local factory for production of electrical and mechanical products. Helene Buechele, 5000 Liberty Avenue, Pittsburgh, is treasurer.

Chicago

PLANS are being considered by First National Airways, Inc., Elmhurst, Ill., for establishment of airport about seven miles from Hinsdale, Ill., with initial hangar unit, 100 x 200 ft., with repair and reconditioning facilities, to cost over \$80,000 with equipment. Other field units will be built later.

Northern Illinois Cereal Co., Lockport, Ill., is considering rebuilding part of mill recently destroyed by fire, with loss of about \$100,000 including machinery.

R. H. Gray, Austin, Minn., manufacturer of motor truck bodies, tops, etc., has awarded general contract to Schradle & Clark, Austin, for one-story addition, to cost about \$30,000 with equipment.

Ovens, power equipment, conveying and other machinery will be installed in new two-story and basement plant to be built by M. & L. Baking Co., 502 West Third Street, Sioux City, Iowa, to cost about \$160,000. E. R. Swanson, Insurance Exchange Building, is architect.

Central West Public Service Co., Omaha, Neb., is considering one-story addition to steam-operated electric power plant at Westhope, N. D., 75 x 100 ft., to cost over \$100,000 with equipment.

Baker Iron Co., Minneapolis, recently organized, has established plant at 2205 Hiawatha Avenue, and will give over majority of present output to ornamental iron products, fire escapes, etc.

Rocky Mountain Power Co., Helena, Mont., has started work on camp buildings at Polson, Mont., in connection with hydroelectric power project on Flathead River, to include one-story machine shop, electric substation for camp power and lighting, storage and distributing units, and other buildings. Construction will soon begin on power project, to cost over \$15,000,000 with transmission system.

Great Lakes Pipe Line Co., Ponca City, Okla., a subsidiary of Barnsdall Corp., 622 South Michigan Avenue, Chicago, will soon begin construction of gasoline pipe line near Mendota, Minn., comprising a section of a proposed line reported on page 275, issue of July 24.

State Department of Institutions, Capitol Building, St. Paul, Minn., plans cen-

tral steam power plant at epileptic colony at Cambridge, Minn., to cost \$150,000 with machinery. Pillsbury Engineering Co., 2344 Nicollet Avenue, Minneapolis, is engineer. W. H. Austin, State Capitol, is commissioner of purchases.

Crane Co. plans to put into production next year a complete line of boilers for domestic and commercial heating plants. Operations will be centered in its Bridgeport, Conn., and Chicago plants.

Jones & Laughlin Steel Corp., Pittsburgh, will erect a one-story addition, 102 x 494 ft., to its warehouse at 2250 West Forty-seventh Street, Chicago.

National Engineering Co., Chicago, has taken over Standard Sand & Machine Co., Cleveland, whose offices have been moved to 549 West Washington Boulevard, Chicago. Standard Sand & Machine Co. will be operated as a subsidiary of National company.

Steel Tank & Products Corp., 4827 South Whipple Street, Chicago, whose plant is at Aurora, Ill., has taken over manufacture and sale of Zeolite water softeners and pressure sand filters for Paige & Jones Chemical Co., Hammond, Ind. Engineering and sales force, which have designed and sold these products for Paige company, have become affiliated with Steel Tank & Products Corp.

Gulf States

CONTRACT will soon be let by Texas, Gulf & Santa Fe Railway Co., Dallas, Tex., for another addition to car and locomotive construction and repair shops at Cleburne, Tex., to cost over \$85,000 with equipment, in connection with expansion and improvements now under way at that place to cost more than \$500,000.

Central Power & Light Co., San Antonio, Tex., is considering construction of a hydroelectric generating plant on Guadalupe River, near Thomaston, Tex., to cost over \$1,000,000 with transmission system.

Southern Kraft Corporation, Panama City, Fla., a subsidiary of International Paper Co., 220 East Forty-second Street, New York, has awarded general contract to Doullut & Ewin Co., New Orleans, for construction of docks in connection with new kraft paper mill, now under way, to be 90 ft. wide and 400 ft. long, including storage and distributing plant on main dock, 90 x 340 ft. Paper mill unit is scheduled for completion at early date and will cost over \$1,500,000 with equipment.

Texas Gas Utilities Co., Del Rio, Tex., is planning construction of natural gas pipe line from Anglin wells, Zavalla County, to Crystal City, Carrizo Springs and vicinity, to cost over \$100,000 with equipment.

Construction Quartermaster, United States Army, Maxwell Field, Montgomery, Ala., is planning early call for bids for erection of four steel hangars, each about 110 x 220 ft., with repair facilities, at local air field.

Col-Tex Refining Co., Colorado, Tex., has authorized expansion improvements at local gasoline refinery to cost about \$100,000 with equipment. Headquarters are at Oklahoma City, Okla. Walter Clarke is one of heads of company.

Board of Education, San Antonio, Tex., will install vocational training equipment in new senior high school in Spanish Acres district, for which general contract has been let to Walsh, Burney & Key, Inc., 923 Flores Street, to cost about

\$1,000,000. Phelps & Dewees, San Antonio, are school architects; W. E. Simpson Co., Milam Building, is engineer.

Southland Greyhound Lines, Inc., 713 Milam Street, Houston, Tex., operating a motor bus system, has awarded general contract to Moody & Hughes, Dallas, for one-story bus service, repair and garage building, 80 x 200 ft. Bertram C. Hill, Construction Industries Building, Dallas, is architect.

Mac Automatic Copy Holder, Inc., Belote Building, South Jacksonville, Fla., recently organized by Dr. D. Milton McCauley, South Jacksonville, and associates, is planning establishment of plant for manufacture of a patented copy-holder for typewriters and other service. F. O. Hindle will be in charge of production.

Birmingham branch of Crane Co. has awarded contract to Southern Steel Works Co. for structural steel frame on new shop building, one story, 140 x 200 ft. Martin J. Lide, Woodward Building, Birmingham, is engineer.

Milwaukee

A NEW branch warehouse and service plant in Milwaukee is being established by General Electric Co., which has leased five and one-half floors in new eight-story express terminal of Milwaukee Electric Railway & Light Co. Shop equipment costing \$150,000 has been ordered. A. L. Pond is manager.

William F. Eichfeld & Son Co. has been organized by William F. Eichfeld, for many years vice-president and general manager of A. F. Wagner Architectural Iron Co., Milwaukee, and his son, W. Kenneth Eichfeld. Plant will be established immediately for production of structural steel, architectural and ornamental iron and general metal building materials. Location will be announced this week.

Milwaukee Department of Public Works is taking bids until Oct. 9 for an elevated steel tank with capacity of 1,500,000 gal., for municipal waterworks. Bond of \$33,000 or check for \$16,500 required with each proposal. David McKeith is commissioner.

Wood & Metal Products Co., Manitowoc, Wis., has been organized by local interests which have bid in plant and property of defunct Weyer Mfg. Co., and will continue manufacture of children's coaster wagons and other wood and metal specialties.

Plant of snow fence division of Wheeler-Arnold Co., Wittenberg, Wis., was burned Sept. 23, with loss of \$25,000. Intentions are to re-establish operation at once, either in leased quarters or new building, and replace equipment.

J. W. Hewitt Machine Co., 131 North Commercial Street, Neenah, Wis., has broken ground for one-story shop addition, 40 x 148 ft., with electric traveling crane, costing about \$30,000 with equipment now being purchased. It will be used for grinding large paper mill rolls.

A. O. Smith Corp., Milwaukee, has placed contract for complete air conditioning equipment of new \$1,500,000 engineering and research building, eight stories, 170 x 205 ft., with National Carbon Machinery Co., Chicago. Order is considered one of largest on record.

Unit Corp. of America, Bankers Building, Milwaukee, reports new orders and releases by Fuller gear division, Kalamazoo, Mich., for first three weeks

of September exceeded those of any other month of 1930. October is expected to be largest month in point of shipments made.

Massey-Harris Co., Ltd., Toronto, has stepped up operations at its plant in Racine, Wis., formerly J. I. Case Plow Works, to nearly 100 per cent of capacity and increased payroll to approximately 1000. Racine plant chiefly produces tractors. Implement division will also go on increased schedule shortly. Toronto works, closed for some time for inventory and overhauling, has resumed work, and Batavia, N. Y., branch also has just been started.

Cleveland

PLANS are under way by Cleveland Wire Works Division of General Electric Co., 1770 East Forty-fifth Street, Cleveland for addition for manufacture of wire filaments for electric lamps and kindred precision wire products, to cost about \$450,000 with equipment.

Master Tire & Rubber Co., Findlay, Ohio, operating Cooper Corporation, with local mill for production of rubber goods, and Fains Rubber Co., Cuyahoga Falls, Ohio, has acquired a controlling interest in Giant Tire & Rubber Co., Findlay, manufacturer of automobile tires and tubes, and will operate as a subsidiary. It is proposed to concentrate production of Cooper and Giant companies in Cooper mill and carry out expansion.

Cleveland Steel Products Co., 7300 Madison Avenue, Cleveland, manufacturer of pumping machinery, oil burners and kindred mechanical equipment, has awarded general contract to H. E. Klefman Co., 2844 Lorain Avenue, for one-story addition, to cost about \$45,000 with equipment. George S. Rider Co., Marshall Building, is architect and engineer.

Owens-Illinois Glass Co., 965 Wall Street, Toledo, Ohio, is considering expansion in certain lines of output, to cost over \$250,000 with equipment.

City Council, Wellsville, Ohio, has approved a fund of \$25,000 for purchase of water meters for municipal water department.

Bixler Co., Fremont, Ohio, recently recapitalized for \$500,000, manufacturer of sectional dining cars, including parts and assembling, is planning removal of plant to Norwalk, Ohio, where it will occupy factory formerly used by A. B. Chase Co., manufacturer of boats. Expansion will be carried out at new location. Fremont Metal Body Co., Fremont, manufacturer of automobile bodies, parent organization of Bixler company, is contemplating a similar removal of plant to Norwalk.

St. Louis

BIDS are being asked on general contract by St. Louis Screw & Bolt Co., 6900 North Broadway, St. Louis, for one-story addition, 180 x 240 ft., to cost about \$250,000 with equipment. Company engineering department is in charge.

Welded Products Corporation, Seventeenth Street and Cleveland Avenue, Kansas City, Mo., has awarded general contract to John H. Thompson Construction Co., 114 West Tenth Street, for new one-story plant, to cost about \$60,000 with equipment. Frederick H. Michaelis, 114 West Tenth Street, is architect.

Chickasha Cotton Oil Co., Chickasha, Okla., is planning to rebuild part of plant

recently destroyed by fire, with loss over \$100,000 including equipment.

Common Council, Tribune, Kan., plans installation of elevated steel tank and tower in connection with extensions and improvements in municipal waterworks. F. E. Devlin, Wheeler-Kelly-Hagney Building, Wichita, Kan., is consulting engineer.

Rogers Iron Works, Rogers, Ark., recently organized, has leased a local site for erection of one-story plant for general iron and steel working, to cost about \$40,000 with equipment. William Gilbert, Ada, Okla., is head.

Athletic Mining & Smelting Co., South Fort Smith, Ark., is planning to rebuild zinc plant recently destroyed by fire, with loss about \$100,000 with machinery.

Continental Gas & Electric Corporation, 1330 Grand Avenue, Kansas City, Mo., operating Kansas City Power & Light Co., same address, Panhandle Power & Light Co., and other power and light utilities, is disposing of a bond issue of \$16,000,000, part of proceeds to be used for expansion and improvements.

Jonesboro Rice Milling Co., Jonesboro, Ark., recently organized by Harry E. Bovay, Dermon Building, Memphis, Tenn., and associates, has secured local site for erection of rice-milling plant, including screening, conveying and other equipment, storage bins, etc., to cost about \$120,000.

Board of Education, Seminole, Okla., has authorized installation of manual training department in one and two-story addition to high school, for which general contract has been let to R. H. Chase Paving Co., Seminole, to cost about \$100,000. Hawk & Parr, Hales Building, Oklahoma City, Okla., are architects.

St. Louis County (Mo.) Water Co. will spend \$3,500,000 for improvements in plant and distributing system. A new high pressure pumping station, additional purifying facilities and installation of large mains will be undertaken immediately at a cost of \$1,500,000. Additional expenditures of \$2,000,000 are contemplated during next few years.

Cincinnati

BIDS have been asked on general contract by R. A. Becker Varnish Co., Harrison and Garrard Streets, Cincinnati, for two main one-story units, 75 x 142 ft., and 37 x 109 ft., to cost over \$100,000 with machinery. Rendigs, Panzer & Martin, Southern Ohio Bank Building, are architects.

Eastman & Budke, First National Bank Building, Springfield, Ohio, architects, have awarded a general contract to John Chapman, Springfield, for a one-story automobile service, repair and garage building, to cost about \$125,000 with equipment.

Contracting Officer, Wright Field, Dayton, Ohio, is asking bids until Oct. 8 for 200 gun control switch assemblies, 6000 running light shell assemblies; until Oct. 15 for 60 engine gage units, 20 oil pressure gage assemblies, 325 thermometer gage assemblies, 35 altimeter assemblies.

Tennessee Public Service Co., Newport, Tenn., is arranging for purchase of plants and property of Knoxville Power & Light Co., Knoxville, Tenn., and will operate as one of main units. Expansion is planned, including transmission line construction. Purchasing company has authorized a bond issue of \$7,000,000,

part of fund to be used for acquisition and development. *Acquiring company is under direction of Electric Bond & Share Co., 2 Rector Street, New York.

Manncraft Airplane Corporation, Collierville, Tenn., has plans for new hangar with repair facilities, 60 x 120 ft., to cost about \$30,000 with equipment.

Ballard & Ballard Co., 912 East Broadway, Louisville, has filed plans for a new grain elevator with capacity of 715,000 bu., to cost about \$750,000 with equipment.

American Blower Corporation, Tennessee Avenue and Reading Road, Cincinnati, manufacturer of mechanical draft equipment, dryers, heaters, etc., with main plant and headquarters at Detroit, has asked bids on general contract for a one and two-story and basement addition, to cost over \$40,000 with equipment. Russell Potter, American Building, Cincinnati, is architect.

Indiana

PLANs are under way by H. E. LaBour Foundry Co., Elkhart, for new one-story plant, 30 x 70 ft., to cost about \$24,000 with equipment.

Coca-Cola Bottling Co., Washington, plans installation of automatic bottling equipment, sealing, capping and other machinery, in new two-story plant, 50 x 100 ft., for which bids will soon be asked on general contract. Benjamin Clawson, 503 Pearl Street, is architect.

Mead Johnson Terminal Corporation, Evansville, recently organized by E. Mead Johnson, Sr., head of local Mead Johnson Co., St. Joseph Avenue, manufacturer of prepared foods, has awarded general contract to M. J. Hoffman Construction Co., Furniture Building, for rail and river terminal, 118 x 413 ft., to cost \$400,000, with elevating, conveying and other equipment. Contractor is also engineer for project; Frank Fowler, Furniture Building, is architect.

W. J. Holliday & Co., 545 West McCarty Street, Indianapolis, manufacturer of iron and steel products, is considering purchase of property at Hammond, as site for new mill to cost over \$200,000 with equipment.

Pacific Coast

CONTRACT has been let by Stockton Fire Brick Co., Russ Building, San Francisco, to Larsen & Larsen, same address, for new plant on 20-acre tract at Pittsburg, Cal., including machine shop, power house and other structures, to cost about \$400,000 with equipment. K. Theill, 580 Market Street, San Francisco, is engineer.

Los Angeles Soap Co., 617 East First Street, Los Angeles, has awarded general contract to Herbert M. Baruch Corporation, Lincoln Building, for five-story and basement storage and distributing plant, to cost over \$125,000 with equipment. Morgan, Walls & Clements, Van Nuys Building, are architects.

Board of School Trustees, Ventura, Cal., has authorized plans for a new manual training school unit at Ventura Avenue school. An automobile service and garage building will also be erected. Roy C. Wilson, 959 Main Street, Santa Paula, Cal., is architect.

Fresno Irrigation District, Griffith-McKenzie Building, Fresno, Cal., is planning an irrigation and hydroelectric power project in Fresno and Madera

counties, to provide for irrigation on 241,300 acres. A power dam 247 ft. high and 3400 ft. long will be built at Friant. Entire project will cost over \$8,000,000. George L. Swendsen, address noted, is chief engineer for District, and has applied to State for permission.

F. C. Stettler Mfg. Co., 300 Oregon Street, Portland, manufacturer of folding paper boxes and containers, has awarded general contract to L. H. Hoffman, Public Service Building, for rebuilding part of plant recently destroyed by fire, to cost over \$250,000 with machinery.

Springfield Mill & Grain Co., Springfield, Ore., is considering rebuilding part of milling plant recently destroyed by fire, with loss over \$200,000 including equipment.

Schicht Brothers, 1207 South Fifth Street, Yakima, Wash., manufacturers of iron and other metal products, have awarded general contract to Leo S. Ross, 206 East Yakima Street, for one-story machine shop, 50 x 80 ft., to cost about \$20,000 with equipment. An overhead crane will be installed.

W. H. Bristol, Clarkston, Wash., has awarded general contract to J. D. Beery, Clarkston, for a two-story meat-packing plant, 65 x 120 ft., with power plant, 18 x 30 ft., to cost about \$90,000 with equipment.

Canada

BIDS will be called immediately for erection of several buildings at Brockville, Ont., for Eugene F. Phillips, Ltd., 5795 De Gaspe Street, Montreal. J. M. Miller, 648 Dorchester Street West, Montreal, is architect.

Canadian Industries, Ltd., 1050 Beaver Hall Hill, Montreal, will build a fertilizer plant at Hamilton, Ont.

Norton Co., of Canada, Ltd., Hamilton, Ont., has let general contract to W. H. Cooper, 36 James Street North, for an addition to cost \$20,000.

Crane Co., Ltd., 1170 Beaver Hall Square, Montreal, has awarded general contract to United Engineers & Contractors (Canada), Ltd., 1010 St. Catharine Street West, Montreal, for one-story addition, 130 x 330 ft.

City Council, Hamilton, Ont., will soon call for bids for erection of a \$50,000 machine shop. Equipment will be purchased. S. H. Kent, City Hall, is clerk.

Bids will be called soon for concrete work for foundations for 2,000,000 bu. grain elevator at Lethbridge, Alberta, for Department of Trade and Commerce, Parliament Buildings, Ottawa, Ont. F. C. T. O'Hara, is Deputy Minister.

Clare Brothers & Co., Preston, Ont., manufacturers of stoves, etc., are contemplating plant addition to cost \$50,000.

Several contracts have been let for an addition, 250 x 490 ft., for Anaconda American Brass, Ltd., 98 Stanley Avenue, New Toronto, Ont.

Foreign

AFUND of \$750,000 has been approved by Municipal Government of Mukden, Manchuria, for local automobile assembling plant, primarily for production of motor trucks of American design. Parts will be purchased for initial operations.

Sydsvenska Kraftalltebolaget, Stockholm, Sweden, operating electric light and power properties, is considering a

new hydroelectric power project in southern part of country, including construction of power dam near Lake Bolmen, where proposed station will be located. Entire project, including transmission lines, will cost over \$1,000,000.

Koninklijke Nederlandse Zoutindustrie, Borkelo, Holland, manufacturer of chemicals, has approved plans for a new unit for production of salt products, securing raw material from natural brines in district, to cost over \$200,000 with machinery.

German Sinclair Petroleum Corporation, Berlin, Germany, a subsidiary of Sinclair Consolidated Oil Corporation, 45 Nassau Street, New York, is planning expansion and improvements to cost over \$1,000,000, including refining, storage and distributing facilities in different parts of country. Harry F. Sinclair, president, is abroad arranging details.

Vauxhall Motors, Ltd., Luton, England, controlled by General Motors Corporation, Detroit, is considering plans for two main multi-story units, totaling about 500,000 sq. ft. floor space, to cost over \$1,500,000 with machinery.

Anglo-Saxon Petroleum Co., Ltd. (Royal-Dutch-Shell), St. Helens Court, London, England, is contemplating a new oil refinery near Buenos Aires, Argentina, to cost over \$1,000,000 with equipment. Project will include an oil storage and distributing plant.

Coming Meetings

October

Associated Machine Tool Dealers. Oct. 6 and 7. Annual convention, Hotel Aspinwall, Lenox, Mass. A. G. Bryant, 2558 West Sixteenth Street, Chicago, secretary-treasurer.

Society of Automotive Engineers. Oct. 7 and 8. Production meeting, Book-Cadillac Hotel, Detroit. R. S. Burnett, 29 West Thirty-ninth Street, New York, director, production activities.

Gray Iron Institute. Oct. 8. Annual meeting, Hotel Cleveland, Cleveland. Arthur J. Tuscany, Terminal Tower Building, Cleveland, secretary-manager.

National Association of Farm Equipment Manufacturers. Oct. 8 to 10, Congress Hotel, Chicago. H. J. Samelt, 608 South Dearborn Street, Chicago, secretary.

American Drop Forging Institute. Oct. 9 to 11. Fall meeting, Briarcliff Lodge, Briarcliff, N. Y. F. W. Sinram, Gears & Forgings, Inc., Cleveland, chairman convention committee.

American Society of Mechanical Engineers. Oct. 13 to 15. Fall meeting, French Lick Springs, Ind. Calvin W. Rice, 29 West Thirty-ninth Street, New York, secretary.

Society of Industrial Engineers. Oct. 15 to 17. Seventeenth national meeting, Mayflower Hotel, Washington. George C. Dent, 205 West Wacker Drive, Chicago, executive secretary.

Mining and Metallurgical Advisory Boards, Carnegie Institute of Technology and United States Bureau of Mines. Oct. 17. Fourth annual meeting, Carnegie Institute of Technology, Pittsburgh. John D. Beatty, Carnegie Institute of Technology, secretary.

American Institute of Steel Construction. Oct. 28 to Nov. 1. Annual meeting, Carolina Hotel, Pinehurst, N. C. Charles F. Abbott, 200 Madison Avenue, New York, executive director.

Machine Tool Production Made Large Gain in 1929

WASHINGTON, Sept. 30.—Making the striking gain of 60.9 per cent, the total value of machine tools produced in the United States in 1929 was \$172,349,996, according to the 272 establishments reporting to the Bureau of the Census, against \$107,101,652 reported for 1927 by 276 plants. Miscellaneous products and receipts for repair work, amounting to \$67,742,968, also were reported for last year.

This industry, the bureau's statement says, embraces establishments engaged primarily in the manufacture of that class of power-driven machines generally covered by the designation "machine tools," but does not include certain types of machines designed for working metal, especially sheet metal-working machines, welding machines, wire drawing machines and wire working machines.

New York Steel Treaters Plan Sessions

Preparations for the monthly meetings of the New York chapter of the American Society for Steel Treating for the coming season have progressed so that a definite announcement is possible for some of the sessions. The first meeting will be Monday evening, Oct. 13, when the chapter will be addressed by Dr. John A. Mathews, vice-president and metallurgist of the Crucible Steel Co. of America, New York, who will discuss the progress in tool steel for the last 20 years. The meeting will probably be held in the auditorium of the Merchants Association, Woolworth Building.

The November meeting on Monday evening, Nov. 10, will take place at the Union Carbide & Carbon Research Laboratories, Long Island City, N. Y. A special program is being perfected. Details of other meetings will be published later.

August Marks Gain in Gray Iron Castings Demand

Improvement in the demand for gray iron castings for the first time in several months is reported in the August report of the Gray Iron Institute, Cleveland. New business taken during the month, 83 foundries reporting, was 56.3 per cent of normal capacity, compared with 54.2 per cent in July. Unfilled orders, as shown by reports from 76 foundries, were 48.4 per cent of normal, compared with 32.7 per cent in July. Production fell off slightly, being 62.8 per cent as against 63.6 per cent in July, as indicated by reports from 159 foundries.

There was a gain in production to 65.4 per cent from 63 per cent in July in the district including Pennsylvania, Michigan, Ohio, Indiana and the area south and west of the Mississippi River. Production also showed a gain in the district including Wisconsin, Illinois and the territory west of the

Mississippi River, 53 foundries showing a production in August of 65.3 per cent as compared with 61.3 per cent in July. Output in the Chicago district increased from 60.8 per cent to 61.1 per cent.

Foundries with a production of less than 100 tons per month and those having a capacity of over 400 tons per month made the best showing. Those having a capacity of less than 100 tons per month operated at 72.5 per cent in August, compared with 68.4 per cent in July. Foundries making over 400 tons per month ran during August at 63.1 per cent of normal capacity, compared with 53.7 per cent in July. Foundries having a capacity of from 100 to 250 tons per month operated at 62.7 per cent in August as against 69.7 per cent in July, and those with a capacity of 250 to 400 tons per month operated at 58.6 per cent in August, compared with 62.6 per cent during the previous month.

Hardware Products Valued at \$203,584,745 in 1929

WASHINGTON, Sept. 30.—Hardware to the value of \$203,584,745 was produced in the United States in 1929, according to the Bureau of the Census. This represented an increase of 7.5 per cent, compared with \$189,411,107 reported for 1927.

The 1929 total was made up as follows: Builders' hardware, other than locks, \$54,650,383; casket hardware, \$4,487,107; locks, \$30,407,745; furniture and cabinet hardware, \$14,907,631; piano and organ hardware, \$553,325; saddlery and harness hardware, \$3,935,985; trunk and suit case hardware, \$2,424,264; vehicle hardware, \$60,794,389; other hardware, \$31,423,916.

Among items not covered in the classification of hardware are nails and spikes, wire and wire products, small machines, such as grinders and lawn mowers, plumbers' supplies, tools and cutlery, and screws and bolts.

Coke Stocks Increase and Production Drops

WASHINGTON, Sept. 24.—Stocks of by-product coke on hand at producers' works increased 13 per cent in August, according to the Bureau of Mines. Nearly all of the increase was at plants not connected with blast furnaces.

Total production of by-product coke in August was 3,637,339 net tons, an average of 117,334 tons a day, a decline of 3.5 per cent when compared with July. Production of beehive coke in August was 169,500 tons, the lowest in any month since the early history of the industry.

Owen Bucket Co., Cleveland, has opened a branch office and warehouse at 36-25 Twenty-second Street, Long Island City, N. Y., in charge of Frank W. S. Elmes. A stock of buckets and parts will be carried. Branch offices were recently opened at Chicago and Oakland, Cal.

Republic Steel Omits Common Dividend

Directors of the Republic Steel Corp. have voted to omit the dividend on the common stock due at this time. The corporation was incorporated in April and on May 28 declared an initial quarterly dividend of \$1 a share on common stock.

Tom M. Girdler, chairman and president, said:

"During the early months of its existence the corporation has been under heavy organization expense incident to the effecting of a large industrial merger. At the same time the period has been one of severe recession in trade, and directors do not regard a dividend on common stock advisable now."

Reduced Pig Iron Rates from South to Continue

WASHINGTON, Sept. 30.—Reduced rates on pig iron from blast furnaces to Gulf, South Atlantic and North Atlantic ports and to interior destinations in the East and New England will be continued to Sept. 30, 1931. The lowered rates went into effect in June, 1929. They were filed by Southern carriers at the request of blast furnace interests in the South in an effort to reach wider markets and to reduce surplus stocks. Protests against the rates were made by Northern and Eastern blast furnace interests and by New England and Trunk Line carriers. They asked the Investigation and Suspension Board of the Interstate Commerce last week to suspend the schedules. Southern railroads and Southern pig iron makers asked for extension of the rates. The commission declined to suspend the schedules.

Under the schedules, rates from Birmingham, in gross tons, to typical points in the North are as follows: Baltimore, \$5; Philadelphia, \$5.25; New York, \$5.75; Providence, R. I., and Boston, \$5.75.

Production Meeting of Automotive Engineers

Papers to be read at the ninth annual production meeting of the Society of Automotive Engineers to be held at the Book-Cadillac Hotel, Detroit, Oct. 7 and 8, include:

"The Future Development of Tungsten-Carbide as a Cutting Tool," by W. H. McCoy, General Motors Corp.

"Recent Developments in Aluminum Alloys and Their Fabrication," by R. L. Templin, Aluminum Co. of America.

"The Application of Mathematics to Determine the Effect of Time on Production Cost," by Prof. Paul N. Lehoczy, Ohio State University.

"The Tool Engineer's Place in Mass Production," by O. B. Jones, Detroit School of Applied Science.

"Conveyors in the Automotive Industry," by J. H. Hough, Matthews Conveyor Co.

"Wear Allowances and Tolerance on Gages," E. J. Bryant, Greenfield Tap & Die Corp.

European Steel Mills in Need of Orders

Continue Price Reductions

(By Cable)

LONDON, Sept. 29.

THE National Council of Industry and Commerce has passed resolutions urging that immediate steps be taken to protect home industries by the imposition of appropriate tariffs against foreign imports, which injuriously affect trade and employment, limit the development of imperial resources or hinder cooperation of the component parts of the Empire. It further resolved that the Government must keep expenditure within the capacity of the country to pay and that drastic reduction of taxation is urgently necessary.

Depression Continues

The iron and steel situation is worse. Dorman, Long & Co. have closed the Acklam mills and blown out one blast furnace. Pig iron consumers are still cautious buyers, but makers are gradually reducing their stocks. Price reductions are declared to be impossible. Finished iron and steel products are dull, and many mills are idle for lack of orders. Some Colonial business is being booked, but the general export demand is negligible.

British Shipyard Closes

Home shipbuilding orders are scarce, and Cammell, Laird & Co. have closed the Birkenhead yard after launching the last vessel on the stocks.

British industrial council passes resolutions for protective tariff and Government economy.

* * *

American air transport company negotiates for 44-passenger German airplanes.

* * *

Ford Motor Co. building large office building in Cologne, Germany.

* * *

British Government urged to extend credits to pig iron makers as aid to employment.

European Mills Need Orders

Continental markets are still confused. The price decline is less rapid, but works are finding orders difficult to secure. A slight revival of interest in finished products is reported from India and China.

Welsh tin plate makers have reduced their minimum price 1s. (24c.) per base box to 17s. (\$4.13), base, f.o.b. works port, following sharp reductions in the cost of tin and foreign steel. As there was some heavy merchant selling of tin plate for forward shipments at less than the old schedule of prices, prior to the reduction, mills are expecting these orders to be released in addition to a fresh revival of buying.

Galvanized sheets continue quiet despite recent price reductions. Indian specifications are quoted at £12 8s. 9d. per ton (2.70c. per lb.), cost and freight, while the price to other markets is £11 12s. 6d. per ton (2.52c. per lb.), f.o.b. Black sheets are quiet.

Disposal of Old Ships Discussed

The Board of Trade has appointed a committee to consider the economic factors involved in the disposal of old ships, and replacement by new ones. It will report on the desirability in the national interest of steps not involving a grant from public funds being taken to encourage this disposal, and will indicate what the steps should be.

Sir John Norton-Griffiths of Norton-Griffiths, Ltd., contractors, which are increasing the height of the Assouan Dam, was found shot in a boat at Cairo, following his suspension of operations because of Egyptian Government interference.

Belgian production in August was 247,000 metric tons of pig iron and 237,000 tons of raw steel.

German raw steel output in August was 897,000 metric tons, rolled steel 620,000 tons.

Luxemburg output in August was 197,000 tons of pig iron and 177,000 tons of raw steel, with 27 furnaces in blast at the end of the month. Production of the Saar in August was 157,000 metric tons of pig iron, 152,000 tons of raw steel and 110,000 tons of rolled steel.

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at \$4.8665 (par)

British Prices f.o.b. United Kingdom Ports

Ferromanganese, export.	£11 10s.		\$55.95
Billets, open-hearth.....	5 15	to £6 5s.	27.98 to \$30.41
Black sheets, Japanese specifications	12 5		59.61
Tin plate, per base box..	0 17	to 0 17½	4.13 to 4.25
Steel bars, open-hearth..	7 15	to 8 5	1.69 to 1.79
Beams, open-hearth.....	7 7½	to 7 17½	1.60 to 1.71
Channels, open-hearth....	7 12½	to 8 12½	1.66 to 1.87
Angles, open-hearth.....	7 7½	to 7 17½	1.60 to 1.71
Black sheets, No. 24 gage	9 10	to 9 15	2.06 to 2.12
Galvanized sheets, No. 24 gage	11 12½		2.52

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£2 12½s. to £2 13s.	\$12.66 to \$12.90
---	---------------------	--------------------

Billets, Thomas (nominal)	3 12½	to 3 13	17.64 to 17.76
Wire rods, low C., No. 5			
B.W.G.	5 2½	to 5 7½	24.94 to 26.15
Rails, light.....	6 0		29.20
Black sheets, No. 31 gage, Japanese.....	11 5	to 12 12	54.68 to 58.32
Steel bars, merchant....	4 6		0.95
Steel bars, deformed....	4 10	to 4 11	0.99 to 1.00
Beams, Thomas, British standard (nominal)....	4 1	to 4 3	0.93 to 0.94
Channels, Thomas, American sections	5 12	to 5 14	1.24 to 1.26
Angles, Thomas, 4-in. and larger, over ¾-in. thick	4 5	to 4 6	0.94 to 0.95
Angles, Thomas, 3-in....	3 19	to 4 0	0.87 to 0.88
Hoop and strip steel over 6-in. base	4 17½	to 5 0	1.07 to 1.10
Wire plain, No. 8 gage..	5 17½		1.29
Wire, barbed, 4-pt. No. 12 B.W.G.....	9 15		2.11
Wire nails, base.....	6 17½		\$1.29 a keg

More Furnaces Blown Out in Germany

HAMBURG, GERMANY, Sept. 17.—Three blast furnaces at Weidenau, owned by the Lübeck Iron Co. of Lübeck, have been sold for scrapping. The Mannesmann Tube Co. has blown out one of the new furnaces at Huckingen, which began operation about six months ago, so that there were only 74 furnaces in blast throughout Germany at the end of August, compared with 77 at the end of July. Plans for further curtailment of blast furnace operations, if carried out, will leave only 68 or 69 furnaces in blast. German production of foundry pig iron was the lowest in August of any post-war year, except 1923, when the Ruhr was occupied.

Luxemburg producers have experienced little of the general depression of business, but it is noteworthy that the Hadir group of steel mills is beginning to curtail production and reports two furnaces to be blown out and the dismissal of several hundred workers.

Foreign Rail Makers Retain Prices

HAMBURG, GERMANY, Sept. 13.—The International Rail Makers' Association has retained its export prices on rails at £6 7s. 6d. (\$31) a ton, with open-hearth material at £6 15s. (\$32.84) a ton, f.o.b. Antwerp. This decision was taken despite strong pressure from certain foreign buyers, especially South African, for reductions in price. At the recent meeting of the association it was announced that no agreement had been reached with Japanese producers on shipments to Japan, or the export trade with China and Manchuria.

Ford Building German Office Structure

COLOGNE, GERMANY, Sept. 16.—The Ford Motor Co., which is building a large manufacturing plant here, has begun the construction of a \$5,000,000 office building in the city, one of the largest structures of its kind in Germany.

Junkers Planes May Be Sold to America

BERLIN, GERMANY, Sept. 15.—Scarcity of orders in Germany has made it necessary for the Junkers Aircraft Co. to seek increased export trade. The only important buyer in Germany is the Deutsche Lufthansa, as Germany has no military or naval air forces. About two-thirds of the Junkers output of aircraft is now being sold for export and further increases are expected. The company is now negotiating with an American air transport company for a number of its G-38 type of airplanes, the

largest that are commercially built at present. They accommodate 44 passengers, with cabins in the wings, and require a crew of seven men.

Briton Urges Government Aid to Iron Makers

WASHINGTON, Sept. 23.—A proposal that the British government should advance credit to pig iron producers to enable them to begin immediate production against requirements in a more prosperous period, has been made by Sir Joseph Calvert, chairman of the Middlesbrough and District Employment Committee. A report from the American Consulate-General in London says that Sir Joseph Calvert emphasizes his belief that the world is not buying its full pig iron requirements, partly because of unsatisfactory international financial conditions. He believes, however, that the Bank for International Settlements will succeed in restoring some European financial stability, which will result in British iron producers receiving increased orders. Extension of credit now would tend to reduce unemployment, effect a considerable saving in payments to unemployed and will be to the advantage of the taxpayer, as the money will be eventually returned with deferred interest.

General Decline Apparent in World Tungsten Trade

China, most prolific world source of tungsten for the past several years, and the United States, which is the largest consumer of tungsten, both present statistics for the first half of the present year strongly indicative of a declining demand, according to the Minerals Division, Department of Commerce.

This trend appears to have started in the second half of 1929, and, so far as demand is indicated by imports into the United States, to have progressed more rapidly during that period than in 1930, but it is still continuing and the conditions apparently responsible for it are not likely to disappear soon. The great stimulus to sales of tungsten early in 1929, which brought total American imports for that year to more than double their previous post-war record, is believed to be to some extent responsible for the reaction. Expectation of higher consumer prices and of a restricted supply induced heavy buying; with stocks both in the United States and in China above normal, demand has eased off, and a recession of prices has naturally followed.

Files and rasps to the value of \$12,556,019 were produced in 1929 by the 33 establishments reporting to the Bureau of the Census. This was an increase of 1.7 per cent, compared with \$12,346,529 reported for 1927 by 36 establishments.

New Canadian Tariff Slightly Amended

WASHINGTON, Sept. 30.—The principal amendments made in the proposed changes in the Canadian tariff rates and customs law, before finally approved by Parliament on Sept. 22, have been outlined in a telegram received by the Department of Commerce from Commercial Attache Lynn W. Meekins, Ottawa.

They include modifications of the rates for a few of the commodities affected and changes whereby deliveries can be made on bona fide contracts under the old rates up to Nov. 30. Also the new rates on repair parts for agricultural implements and machinery have been deferred until next July. The items previously in effect applying to containers made from tin plate have been restored.

American Companies May Build Canadian Plants

TORONTO, Sept. 23.—One effect of the new Canadian tariff may be to encourage large American companies to establish branch plants in the Dominion. It is reported that the Crucible Steel Co. of America is negotiating for the purchase of a site in Montreal, Toronto or Hamilton, with a view to establishing a Canadian branch plant. Another American steel company, the American Manganese Steel Co., subsidiary of the American Brake Shoe & Foundry Co., is also reported to be looking over the Canadian situation with a similar idea in mind.

Output of Screw Machine Products High in 1929

Production of screw machine products and wood screws in 1929, by 254 manufacturers reporting to the Bureau of the Census, was valued at \$83,266,687. This figure represents an increase of 66.5 per cent, compared with \$50,009,983 reported by 218 establishments for 1927. Of the 1929 total, \$9,726,556 represented wood screws and \$73,540,131 screw machine products.

Wage earners numbered 18,749 in 1929 and 13,690 in 1927. Their wages were \$26,802,152 and \$18,055,095, respectively.

Steel Barrel Shipments

Members of the Steel Barrel Manufacturers' Institute shipped 367,422 barrels in August, and had unfilled orders at the end of the month amounting to 352,925, or approximately one month's shipments at the current rate. Business for the month is reported at \$973,112. Capacity was engaged to the extent of only 12.5 per cent for I.C.C. barrels and 36.7 per cent for light barrels, making an average of 31.6 per cent for all barrels.

Metal Congress Listens to Nearly 100 Papers

(Continued from page 940)

a former Campbell lecturer, paid a compliment to the work of the speaker and pointed to the fact that the oldest lecturer was introducing the youngest thus far. Dr. Grossmann, before commencing his address, referred to the chairman as his friend and counselor.

New light on this subject was thrown by Dr. Grossmann. It is expected that an extended abstract of the lecture can be published soon, so that only a few of the points can be touched on here.

By way of preface Dr. Grossmann said that he had selected his subject as one of the several which Dr. Campbell, in whose memory the lecture was established, was once actively interested in and concerning which several years ago he had made certain statements which have later become unimpeachable.

The various analytical methods for determining oxygen in steel were first

discussed with special reference to the Jordan vacuum fusion method for ascertaining total oxygen. Those for determining the oxide inclusions, or actual residues, by means of which useful information is possible, were also touched on.

Abnormal Steel Caused by Oxygen

The main part of Dr. Grossman's lecture was a discussion of the effects of oxygen in certain heat-treating reactions, particularly those where the content of oxygen is increased by heat treatment as in carburizing. It was demonstrated by analysis and photomicrographs that certain steels absorb oxygen when carburizing is carried out by means of certain charcoal base solid compounds. This speaker showed that higher manganese steels of certain types reduce this increase in oxygen content.

There followed a discussion to prove that this explanation for soft spots in certain carburized steel—or what are known as "abnormal" steels—is due largely to this absorbed or dissolved oxygen. The steps which led up

to these conclusions were carefully and clearly described.

Then followed the discussion of the results obtained by carburizing with methane gas as a substitute for the charcoal base carburizers. It was demonstrated that the phenomena of soft spots, or areas of ferrite, do not form because there is no oxygen present and that abnormal steels do not result from this method of carburizing.

Special Dinners and Banquets a Feature

EACH of the technical societies participating in the National Metal Congress held special dinners or banquets during the week. They were all well attended.

For the dinner of the A.I.M. and M.E., W. J. MacKenzie, Republic Steel Corporation, Chicago, acted as chairman. Dr. W. H. Bassett, American Brass Co., president of the A.I.M. and M.E., spoke and there were short addresses by A. B. Kinzel, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y., by Dr. Zay

Here and There at the Congress

SOME of the visitors were driven about the city from time to time in a new Chrysler 77 which was trimmed largely with "rustless iron"—the hood, the fenders, the radiator, the lamps, the wire wheels and several minor parts. It was built especially for the Rustless Iron Corporation of America, New York and Baltimore. The proud chauffeur was Dr. Simmons of the New York office. It presented a beautiful appearance and attracted much attention, located later in the basement exhibition.

A CLEVER and unusual advertising scheme was put over by the Columbia Tool Steel Co., Chicago. Each day a small four-page newspaper was put under the door of the rooms of visiting delegates. It was called "Columbia Tool Steel News, Steel Treathers' Edition." It contained the daily programs, with illustrations appropriate to the occasion, including photographs of prominent officers and authors of papers. It created much favorable comment.

AN interested visitor from abroad was Lewis Chapman of the Jessop Steel Co., Sheffield, England, who is spending a few weeks in America comparing American and British tool steels. He was under the care of Fred Lantsberry of the American branch of the same company, who is a familiar figure at steel treathers' conventions, and who contributed a paper at the Boston convention a few years ago. H. H. Ashdown, a British metallurgist now in this country, was another visitor as well as author of a paper.

A NEAT metal button, a replica of the official emblem of the A. I. M. and M. E., was presented to

each one who registered as a member of that society. It was furnished by the Metropolitan Aircraft Co., 1 Madison Avenue, New York.

THE many friends of Dr. Paul D. Merica, director of research, International Nickel Co., New York, were very glad to see him able to resume his active role in the convention, after a prolonged illness. He was looking the picture of health.

CALIFORNIA was prominent at the Congress. There were five members of the two West Coast chapters, the Golden Gate at San Francisco and the Los Angeles chapters, who were active in promoting the candidacy of F. B. Drake, of the former chapter, for director. They were successful.

BESIDES the small daily paper issued by the Columbia Tool Steel Co., there were two others—the regular convention daily of the *Daily Metal Trade*, Cleveland, and the *Automotive Daily News*, New York, which freely distributed issues each day containing special convention news.

SMALL wooden hammers, with a whistle in the handle, were handed to each man attending the dinner of the institute of metals division and the iron and steel division of A. I. M. and M. E. The ladies were furnished with paper fans, attractively decorated—and they were needed, for the night was a very warm one.

C. E. HOYT, executive secretary of the American Foundrymen's Association, whose headquarters are in Chicago, was a frequent visitor. He was recovering from a severe

attack of hay-fever to recuperate from which he had been north for several weeks. Technical Secretary "Bob" Kennedy was also often seen.

THERE were several chapters of the A. S. S. T. which sent delegations who came in special sleepers. The Boston chapter had a group of about 20, the Hartford aggregation numbered at least 10 and the New York and New Jersey chapters made a group of about 20.

LEARNING a foreign language by a new and novel method was related by a German scientist who has been in this country only four months. He has become the research engineer of a large company and speaks fluent English. When he reached the United States in May, he could not speak English though he could read it. He spent many evenings at the "talkies" and in that way soon acquired proficiency in the language. He relates that he often repeated his hearing of a movie if there was something he wanted to fix more completely in his mind. This is a hint to steel treathers who may some time be similarly placed in Germany or France.

NOT every technical society can boast of feminine members who lend it distinction. Frances Clark, metallographist of the Western Union Telegraph Co., New York, and a member of the New York chapter, was present the entire week. She acted as vice-chairman of the first technical session of the A. S. S. T.

ONE of the new plans of the steel treathers for next year is a dinner meeting of the executives of heat-treating plants.

Jeffries, by R. G. Guthrie, president of the A.S.S.T., and by J. R. Van Pelt, of the Field Museum of Chicago. As the feature of the evening, Dr. B. D. Saklatwalla, vice-president, Vanadium Corporation of America, Bridgeville, Pa., discussed "Vanadium." This was in line with the procedure of previous dinners, such as one at which Dr. F. M. Becket, Union Carbide & Carbon Co., New York, discussed "Chromium," and another at which A. J. Wadhams, manager, research department, International Nickel Co., New York, spoke on "Nickel."

The dinner of the A.S.M.E. was presided over by C. W. Bennett, vice-president, American Sheet & Tin Plate Co., Pittsburgh, and the principal address was made by F. H. Willcox, Freyn Engineering Co., Chicago, who told about Russia.

At the Congress Hotel, where the A.W.S. held all its meetings, a dinner followed by a dance took place the evening of the fourth day.

Medals and Honors at Annual Meeting

A GRATIFYING increase in membership of the A.S.S.T. over the last year was reported by W. H. Eisenman, secretary, at the annual meeting of the society which preceded the Campbell memorial lecture. In a combined report of the secretary and treasurer, Mr. Eisenman stated that total membership as of Aug. 31 was 6033, a gain of 7.4 per cent over last year. During the year, the York, Pa., group was added to the society, while the Columbus, Ohio, and Newark, N. J., groups were advanced to chapter rating.

Howe Medal Awarded to H. J. French

Herbert J. French, International Nickel Co., Bayonne, N. J., was awarded the Henry M. Howe gold medal, which is presented annually to the author of the best technical paper published in the society's transactions during the past year. Mr. French's paper was entitled "A Study of the Quenching of Steels."

Dr. Zay Jeffries, consulting metallurgist for the General Electric Co., was awarded the past president's medal as a token of appreciation for his work and interest in the society.

New Jersey Chapter Gets the Bell

The president's bell and gavel were presented to the Newark, N. J., chapter in recognition of its exceptional progress since organization two years ago. This prize is awarded annually to the chapter which has aided the national officers most and excels in progressiveness in organization and educational features. It remains in the possession of the winning chapter for one year.

Next Convention at Boston

The 1931 congress and exposition will be held in Boston the last week in September. A much larger exposition is planned.

The Campbell memorial lecture next year will be delivered by Dr. C. J. Herty, Jr., of Bureau of Mines, Pittsburgh.

Officers of A. S. S. T. for 1931

President: J. M. Watson, Metallurgist, Hupp Motor Co., Detroit.

Vice-President: A. H. D'Arcambal, Sales of Small Tools and Metallurgist, Pratt & Whitney Co., Hartford, Conn.

Secretary (2 years): W. H. Eisenman, present secretary.

Directors (2 years): B. F. Shepherd Ingersoll-Rand Co., Phillipsburg, N. J.; F. B. Drake, Johnson Gear Co., Berkeley, Cal.; R. G. Guthrie, Metallurgist, Peoples Gas, Light & Coke Co., Chicago, retiring president.

Electrochemists Discuss High-Test Gray Iron

A TECHNICAL society that a few years ago conducted the first round-table luncheon on a technical topic held another one last week in Detroit. In 1923 the American Electric Chemical Society made a decided hit in a round-table discussion on "Electric Furnace Brass Melting." Some 200 men in a Dayton, Ohio, hotel gathered around a number of tables and, under the able direction of Dr. H. W. Gillett as chairman, discussed many of the then new problems in this field. It was a very important meeting. In 1919 and 1920 there were special sessions on electric gray iron.

Since initiating this type of meeting, the A.E.S. has held many such gatherings and the custom has spread to the American Foundrymen's Association, which conducted several at its annual gathering in May at Cleveland, this year, and to other societies.

Round Table on Electric Gray Iron

This year the round table on "Electric Furnace Gray Iron" was a feature of the fifty-eighth meeting of the society at the Hotel Statler, Detroit, Sept. 25 to 27. There was a large gathering at the luncheon, held Friday noon, Sept. 26, which was under the chairmanship of Dr. Richard Moldenke. Many foundrymen and some furnace and steel men from the National Metal Congress at Chicago, which was in session Sept. 22 to 26, were present.

Dr. Moldenke introduced the discussion with a paper on "The Production of High-Test Iron." Previous to the luncheon, as the last paper of a general scientific session during the morning, there was a preliminary to the round-table discussion in the form of a paper, "The Detroit Rocking Electric Furnace," by Carl H. Morken, foundry engineer, the Detroit Electric Furnace Co., Detroit. These papers and a review of the discussion, as well as a running account of the round table, will be published in *THE IRON AGE* in an early issue.

Symposium on Corrosion in Automobiles

Another successful round-table discussion was credited to the society. It was organized by the joint efforts

of A. T. Hinckley, U. S. Light & Heat Corporation, Niagara Falls, N. Y., and H. M. St. John, Detroit Lubricator Co., Detroit. The informal discussion lasted well into the late afternoon.

For the first technical session on Thursday, Sept. 25, the electrochemists conducted a symposium on "Prevention of Corrosion in the Automotive Industry." Its organizer was Dr. F. N. Speller, National Tube Co., Pittsburgh, a recognized authority on corrosion. Seven technical papers, most of them relating to plated products or coated metals, were scheduled.

On the convention's last day an electrodeposition program was carried through, made up of seven papers on deposition of nickel, silver, iron-nickel alloys, nickel-cobalt alloys and lead-thallium alloys.

Registration at this convention was large, reaching about 300. This was one of the best attended meetings in several years. The interest in the round-table discussion helped to swell the total. The local Detroit committee of 19 under W. W. McCord, chairman, research engineer, McCord Radiator & Mfg. Co., made the occasion the success it was.

Next Convention in Birmingham

The annual spring convention is scheduled for Birmingham, April 23 to 25, at the Hotel Tutwiler. Subjects to be covered include electric steel, electronics used, electrochemistry and ceramics. Papers should be in the hands of the secretary not later than Feb. 15, 1931.

Cast Iron or Steel Stools for Ingot Molds

(Concluded from page 921)

States and foreign countries, it seems that, without prejudice, the old hole-and-bolt methods of cast-in hooks are still the most desirable ones.

Conclusions

Although apparently a casting of the least concern, the ingot mold stool of today is of almost the same importance as regards economy and output as the part it supports, the ingot mold. Therefore, the same consideration to physical, thermal and chemical influences should be given equally to mold and stool. Comparative tests and investigations have revealed the

Compositions of Metal in Stools

Type	Chemical Composition							Mold Made of	Number of Heats Before Scrapping
	T.C.	Si	Mn	P	S	Cr	Ti		
Gray iron	...	1.24	0.93	0.136	0.049	...	0.01	Same iron	98
	3.71	1.37	1.03	0.118	0.041	...	...	Same iron	67
	...	1.59	1.11	0.137	0.038	...	...	Same iron	58
Alloy gray iron	3.38	1.18	0.96	0.120	0.036	0.94	...	Without chrome	161
	3.64	1.20	1.18	0.144	0.050	1.23	0.02	Same iron	177
	3.28	1.42	1.28	0.132	0.034	0.88	...	Without chrome	194
Cast steel	0.39	0.32	0.69	0.041	0.032	0.02	...	Gray iron	258
Alloy steel castings	0.41	0.38	0.73	0.034	0.028	0.59	...	Gray iron	279
	0.36	0.26	0.84	0.023	0.019	1.34	...	Gray iron	342

fact that the adaptation of higher priced materials used in the manufacture of stools is a well-repaying policy for both steel works and rolling mills.

In order to prove definitely which kind of metal would represent the most economical one in works routine, exhaustive comparisons on this subject are always desirable information for present and future decisions in each particular locality. In addition, the stool should continuously receive the same care and attention in design, maintenance and storage as ingot molds. Hence, it is advisable to keep similar records on both of these most important items in the production of sound ingots.

Strip Steel Annealed

(Concluded from page 919)

When the strips emerge from the lead bath the line of travel changes abruptly from the horizontal to the vertical, as they rise up over a series of rolls, 20 ft. above the floor, and down again. During this travel they cool off sufficiently to enter the pickle vat, wash tank and galvanizing unit. All of these units are placed in one straight line and the strands pass through each in turn. The cooling rolls are adjustable so that they can be lifted to any required height to give the proper cooling period, regardless of the time cycles in the lead and galvanizing baths. In this manner perfect synchronization is obtained.

Galvanizing the Product

For galvanizing, the setup consists of wood tanks for holding the galvanizing solution, and the work is electroplated as it passes over zinc bars in the tank. Electric current is furnished by four motor-generator sets.

As the strands pass through and out of this bath they run over pulleys, descend through the floor to the room below, where they change direction over a second set of pulleys and pass through a second galvanizing bath, similar to the one described.

Emerging from the last bath the strands are wound up on 18 coiling reels corresponding to those from which they were unwound. This battery of reels is operated from a single motor-driven shaft equipped with slip clutches.

Japanning Equipment Is Provided

In the japanning installation the first unit in line is a gas-fired lead pot for annealing, similar to the one described. There are 20 reels, set on the first

floor, the strands rising through the ceiling and over pulleys to the lead bath on the second floor. In this case bright annealing is desired, and is obtained by cooling the strands in an atmosphere of gas. This atmosphere is confined in a bank of 20 pipes, one for each strand, about 80 ft. long and 1½ and 2½ in. in diameter.

These pipes are located some 10 ft. above the floor and at the charging end are bent down until the ends are submerged just below the level of the molten lead. In this way the pipes are sealed off from the outside atmosphere and the escape of gas which is blown in under pressure is prevented at this end. The strands, after going through these pipes, drop down over a set of pulleys to another set which changes the direction of travel to the horizontal again, so that they will pass through an automatic japanning device and a baking oven, both of which are placed directly under the pipes.

For japanning there is a tank of liquid japan with a series of metal rollers so set in the top that the lower half of each is submerged. The rotation of these rollers coats them with japan and as the strands ride over them they in turn receive a coating of japan.

As this japan must be baked on, the next unit in the line is a gas-fired baking oven made of brick with the gas burners set in the sides. This unit, 30 ft. long, 5 ft. wide and 6 ft. high, is incased in steel plate. There is no hearth and eight tunnel type burners are used, which fire into tunnels running across the oven. The heat is distributed through vents in these tunnels. This oven is carried at 800 deg. Fahr. and this temperature is maintained with the aid of three thermocouples and recording pyrometers. The work remains in the oven from a half minute to a full minute.

As the coiling reels are on the floor below, the strands pass down through the ceiling to them. This battery of coilers is divided into two long rows, and is motor driven. Slip clutches are provided to maintain the correct tension.

Machine Shop Accounting

(Concluded from page 927)

handled by mechanical tabulation. In this manner, due to the time savings in handling, etc., all accounting may be done daily as the work is completed or materials issued. Thus the final cost may be computed the same day an order is closed.

It is desirable that the original shop cards become the final record cards in as many instances as possible, thereby saving much time and avoiding many errors incident to transferring from one record to another. (See payroll card, Fig. 1).

Fig. 5, a form for recording maintenance work, is another example of what may be done along these lines. The card form is filled out by the workman at the source of the maintenance to be done. The card is then approved by the foreman and by the superintendent. In the meantime the work can be started. The time and materials used are charged to the Maintenance Order on regular time cards and material requisitions, in the same manner as for any other order. When the job is completed the time cards and

Business as Others See It

Digest of Current Financial and
Economic Opinion

WHILE business appears to be on the road to convalescence, the "doctors" are predicting a deliberate sort of recovery. Persistence of unfavorable developments is noted, and few wish to hazard a prediction as to the date of the next "normal." *Annalist*, indeed, selects next April as the "far from absurd" date of the nadir whence the slow climb back to business health is to begin.

That organ believes we are suffering from an "overproduction of optimism," and opines that inventories are not so low as some would have us believe. A survey made by Standard Statistics Co. is pointed to as evidence that "stocks of merchandise in the hands of manufacturers, wholesalers and retailers are only slightly below those of a year ago, when measured in physical units."

But a better sentiment is reported by others, Guaranty Trust Co. of New York among them. That bank finds evidence that buyers are "no longer deferring their commitments in expectation of lower prices." It mentions the prevalence of heavy purchases, for months in advance, by many large industrial consumers of copper, cotton textiles, wheat, sugar and other food products.

And the American Steel & Wire Co., in its latest Crop Report, finds that, from the agricultural viewpoint, "the country at large is in better shape than it was expected to be, only a few brief weeks ago."

During the first half of 1930 the railroads spent one-third more, for new equipment and additions and betterment, than in the first half of 1929. This is cited by *Financial Chronicle*, which, however, reports that the August industrial production (Federal Reserve index) failed to make the usual seasonal gain.

This is at variance with the more recent findings of *Business Week*, which sees a more-than-seasonal expansion in September. But, it says, "the rate of improvement is too slow to warrant expectation of return to normal levels in the remaining months of this year."

Consumption is proceeding faster than production, and stocks, in consequence, are going down, in the opinion of the Union Trust Co., Cleveland. Department store sales, allowing for lower prices, were "practically as large in the first half of 1930 as in the same period in the very active business year 1929."

This same indicator is cited by *Commerce and Finance*, which

points also to our August exports. These afford "the most positive evidence of business improvement. . . . The chart is now curving upward, and its upward curve is all America needs to reinspire the enthusiasm now coming to be felt in many directions."

Finally, Alexander Hamilton Institute lists many "straws" showing betterment, including: Greater factory consumption of electricity, higher machine tool orders, increase in exports and in car loadings, better sales of cotton cloth and deliveries of silk, higher woolen mill employment, larger coal output (anthracite going faster than last year), bigger steel production and rubber consumption, more industries showing increase in employment and a halt in commodity price declines.

Besides these statistical factors, a number of economic facts are brought out, such as: Consumers completing installment purchases are now in position to buy; present commodity prices encourage buying; supply of goods is low enough to stimulate replenishment, as a year of recession in production is past; loanable funds ample, at low rates; bonds are providing a source of funds for business expansion.

requisitions are tabulated and the totals transferred to the maintenance order card, which is then punched.

A monthly summary is made of all maintenance order cards completed, and the cards are filed away by equipment numbers. This file then becomes the permanent file of maintenance. Thus, if the plant manager desires to know what the expenditures were for maintenance of any given machine during a given period, the cards are simply taken from the file, and put through the tabulating machine, to get the total cost of maintenance of the machine in question. This total cost may be broken down into hours, labor pay, material cost and amount of burden, as all of this information is punched into the card.

Much Added Information Now Available

IT is obvious that there may be many other ways of using information contained on the regular records of time cards and material requisitions. Much of this information, in the past, was not being used to the fullest advantage, due to the laborious methods of sorting, adding and handling. All of this is simplified by the machine method. Reports of a statistical nature may be easily drawn up and other valuable information compiled, in a very short time, which it was not possible to obtain before machine methods were available.

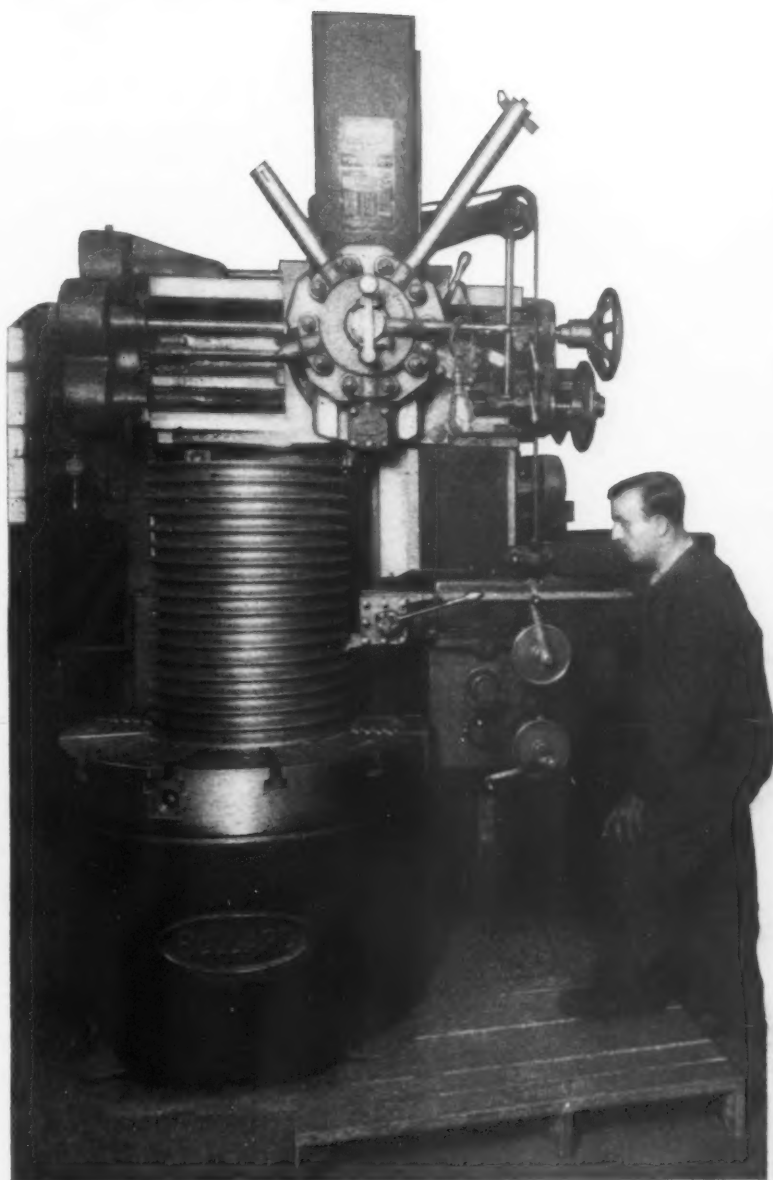
Valuable information regarding sales, by classes of product, territories, salesmen, etc., can be easily obtained. Inquiries for the shop's products may be

classified and the potential markets analyzed. Pattern location records, using code numbers for the various locations, have proved very valuable for controlling insurance, while at the same time furnishing a complete record of patterns and the values, etc.

One record lending itself admirably to this method of accounting is the equipment record, which is a card showing the value, depreciation and other facts pertaining to each item of equipment in the shop. By a system of careful filing of the cards, monthly depreciation charges may be accurately obtained and the entire shop equipment inventoried. The actual figures for depreciation may then be based on the current conditions pertaining to each machine as indicated on the card and punched therein. This does away with the usual approximation or flat percentage of depreciation computation commonly used.

This method, or any other, which tends to make for more accurate accounting for costs, and eliminates the approximations and estimates, is worthy of serious consideration, especially if such methods are more economical as well as more accurate. Mechanical methods are not substitutes for common sense and clear thinking. They are simply an aid whereby the most benefit may be derived from the results of intelligent work, both in shorter time and at less expense.

(In the second and concluding part of this article the author will show how some of the tabulated information is prepared for, and used by, the managing executives of his organization.)



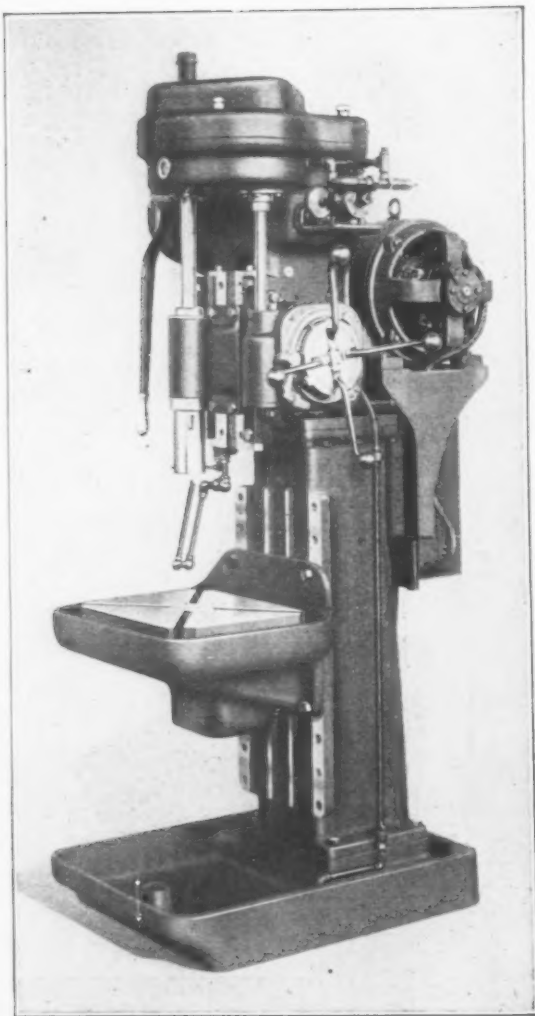
"Profits from within" that economists are talking about show up when you replace older, slower machines with Bullards.

Bullard Vertical Turret Lathes are fast, accurate, economical of time and material and easy to operate.

Let a Bullard engineer explain the Bullard way to get profits from within.

THE BULLARD COMPANY
Bridgeport, Conn.

**VERTICAL
TURRET
LATHE**



High Production LONG LIFE

The SUPER SERVICE Production Drill is built to produce and to endure. Ball bearings, automatic oiling and heat treated, multiple splined, alloy steel shafts and gears are used throughout.

The speed of the SUPER SERVICE Production Drill is quickly adjusted to meet requirements by means of four simple cluster gears of two gears each. Interchanging these gears on three vertical shafts permit of sixteen different combinations. Sixteen closely graded speeds, ranging from 263 to 1233 R.P.M., are the result, and yet at every speed there are only three gear contacts between the main driving shaft and the spindle. Rarely is such simplicity of drive encountered, even on single purpose drills.

Four similar gears provide sixteen rates of feed in the same way.

Flexibility in securing the right speed and feed, with single purpose simplicity, means continuous high production.

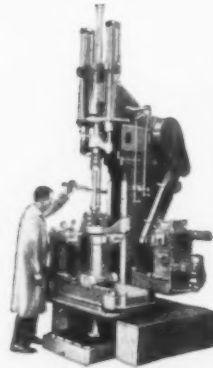
THE CINCINNATI BICKFORD TOOL CO.
Oakley, Cincinnati, Ohio, U. S. A.



SELF-OILING ALL-GEARED DRILLING AND HONING MACHINES

cut costs
and
increase
production

Write today
for
Catalog



No. 2420—Hones cylinders up to 20" diameter by 30" long.

BARNES DRILL CO.
815-831 CHESTNUT ST. ROCKFORD, ILL.

LELAND-GIFFORD COMPANY Worcester, Mass.

Drilling Machinery
Belt and Motor Spindle
One to Six Spindles

Tapping Attachments and Multiple Heads

Kingsbury Automatic Sensitive High Speed Drill Heads



can be furnished in multi-spindle vertical, horizontal and turret type machines. Write for catalogue of these high production machines of 1/4" capacity.

Kingsbury Machine Tool Corp.
Keene, New Hampshire

Lathes—Radial Drills—BECKER Millers WHITCOMB Planers—Milling Cutters Special Machinery

REED-PRENTICE CORPORATION
WORCESTER, MASS.

BRANCH OFFICES:
3-245 General Motors Bldg., Detroit, Mich.
Room 715, 41 Broad Street, New York City

There is no more

profitable way for a man to
invest his time than to read
the journal of his chosen field.

CUTTING KEYWAY-CUTTING COSTS

with the NEWTON Key Seat Milling Machine

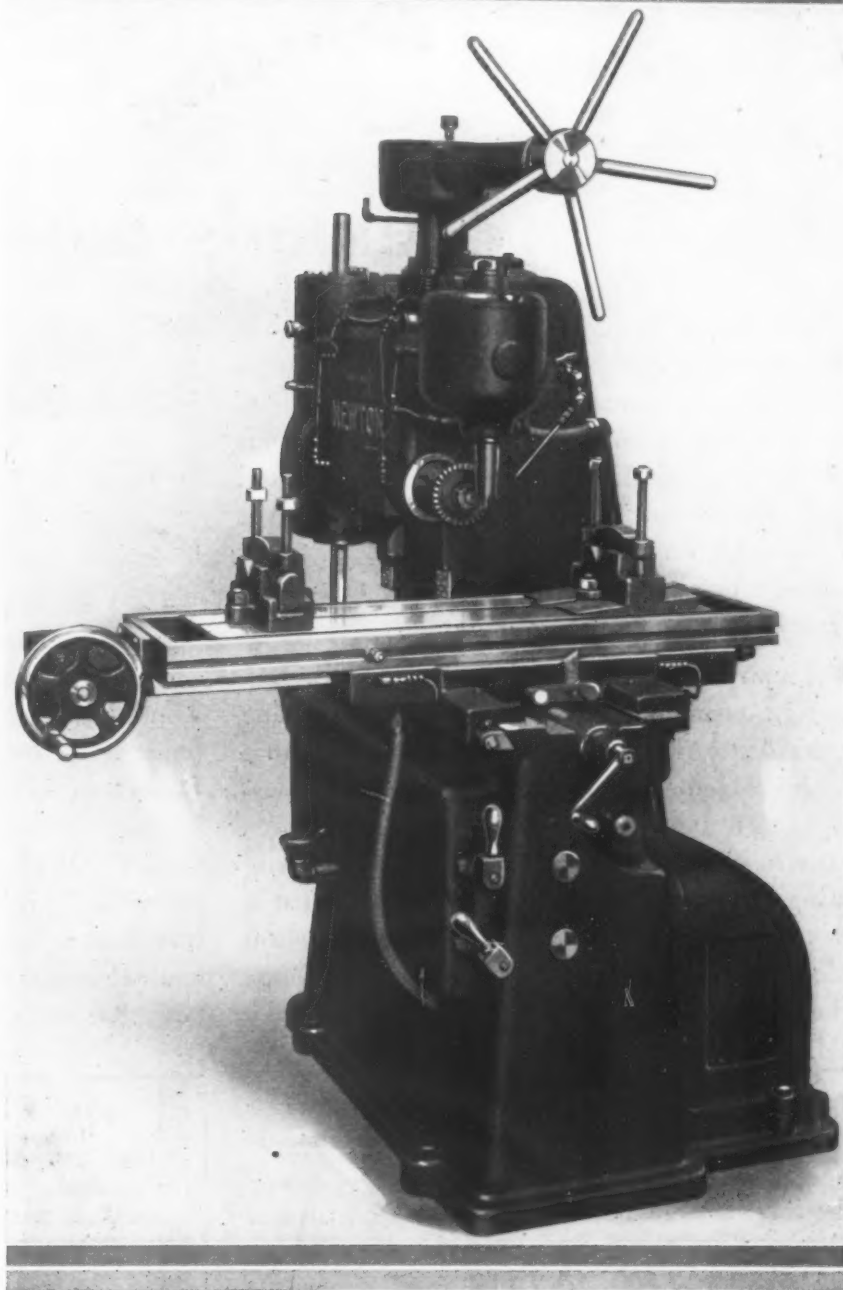
THE higher speeds, the quicker setting, the ease of operation possible with the new Newton Key Seat Milling Machine effect large economies in keyway cutting.

Six changes of speed for both vertical and horizontal spindles, and five changes of table feed insure key seating being done at maximum efficiency.

Key seats are milled the full width, depth, and length in one operation by the cutter on the horizontal spindle. The end mill in the vertical spindle is used only to feather or end keyseats where necessary. No setting is required on this machine beyond clamping the work in the V-blocks, as the table is equipped with stops to locate the work under the cutters.

All controls are located at the front of the machine within easy reach of the operator.

Newton Key Seat Milling Machines are regularly built in two sizes, the smaller having a capacity for 4" diameter shafts and keyway widths from $\frac{1}{4}$ " to $\frac{3}{4}$ " and the larger machine a capacity for 8" diameter shafts and keyway widths from $\frac{1}{2}$ " to $1\frac{1}{4}$ ".



BETTS · NEWTON · COLBURN · HILLES & JONES · MODERN
CONSOLIDATED

CONSOLIDATED MACHINE TOOL CORPORATION of AMERICA, Rochester, N. Y.

Modern

production

demands modern lighting

NO automobile manufacturer would think of mounting a 1920 body on a 1931 chassis. No textile manufacturer who expects to keep up with competition would think of using machines made before the days of, say, the stop-motion. Every manufacturer in these days realizes that the more he improves and modernizes his products the more he must improve and make up-to-date his production equipment.

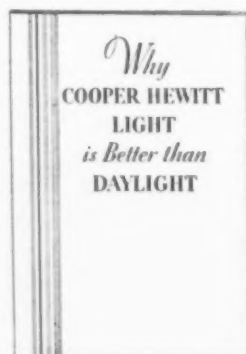
Yet many of these same forward-looking manufacturers overlook entirely the fact that lighting is a decidedly important production tool . . . that great improvements also have been made in systems of illumination . . . and that there is available for their factories today an exclusively industrial lighting system that is as extraordinary in what it achieves in economies and increased production as do some of the most revolutionary of our modern labor-saving machines.

And now, while you perhaps are busy with plans for 1931—installing, it may be, new machinery to produce your new designs, new models or new styles—now is the time to take advantage of these improvements in lighting along with the other items which enter into your manufacturing costs. A glimpse into the plants of America's industrial leaders suggests what one of the most economical and up-to-date systems of illumination can do for you.



BETTER THAN DAYLIGHT

Used in the plants of Henry Ford, General Motors, Graham-Paige, U. S. Aluminum Company, the mechanical departments of The New York Times, Daily News and other outstanding newspapers; the Bullard Machine Company, Curtiss-Robertson Airplane Company and others of similar rank in textile, woodworking and other industries, COOPER HEWITT mercury-vapor light has proved itself the proper light for every work-shop that makes any claim to modern production methods. General Electric Vapor Lamp Company, 833 Adams Street, Hoboken, N. J.



The scientific and economic reasons why these great concerns now use COOPER HEWITTs are explained in our new booklet, "Why COOPER HEWITT light is Better than Daylight." A free copy awaits your request.

GENERAL  ELECTRIC
VAPOR LAMP COMPANY

(Formerly Cooper Hewitt Electric Company)

Join us in the General Electric Hour, broadcast every Saturday evening, on a nation-wide N. B. C. network.

464 © G. E. V. L. Co., 1931

There are no "tough jobs" for a Cleveland Open Side Planer

How often have you had a planer job too large to pass between the housings of your two-post type planer?—many times, no doubt. Then you realized, perhaps, how much easier the job would be on a Cleveland Open Side Planer, because it eliminates the "tough jobs."

Any work that can be mounted on the planer bed can be handled with greater speed and efficiency.

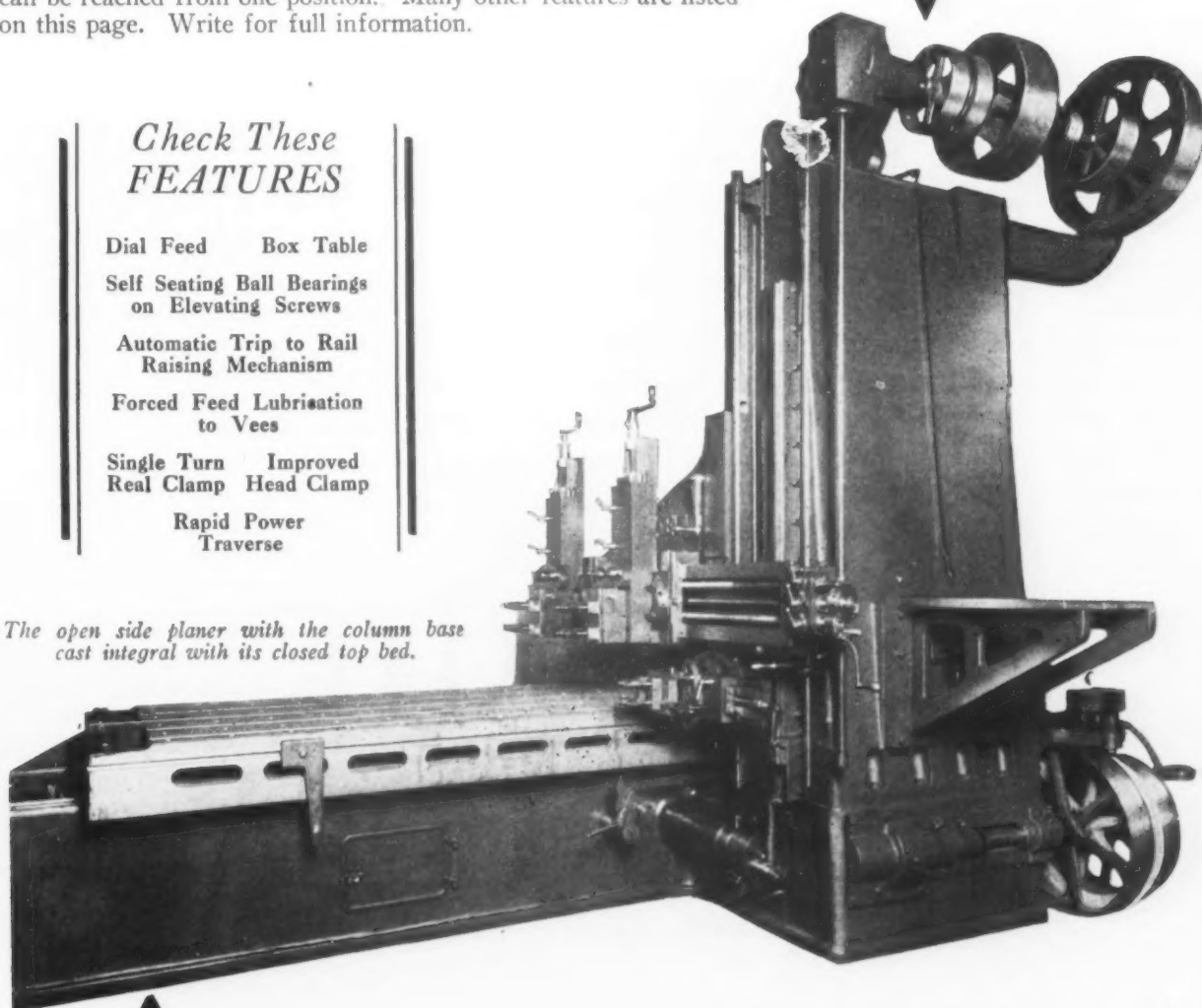
Even in shops where only small work is handled, there are times when odd shapes must be machined which are too big to pass between the housings of the older type two-post planer.

Why not be prepared to handle both large and small work on the same machine? The new Cleveland Open Side Planer gives speed, accuracy, and efficiency on both small and large jobs, which doubles and quadruples the machining range. All operating levers can be reached from one position. Many other features are listed on this page. Write for full information.

Check These FEATURES

Dial Feed	Box Table
Self Seating Ball Bearings on Elevating Screws	
Automatic Trip to Rail Raising Mechanism	
Forced Feed Lubrication to Vees	
Single Turn Real Clamp	Improved Head Clamp
Rapid Power Traverse	

*The open side planer with the column base
cast integral with its closed top bed.*



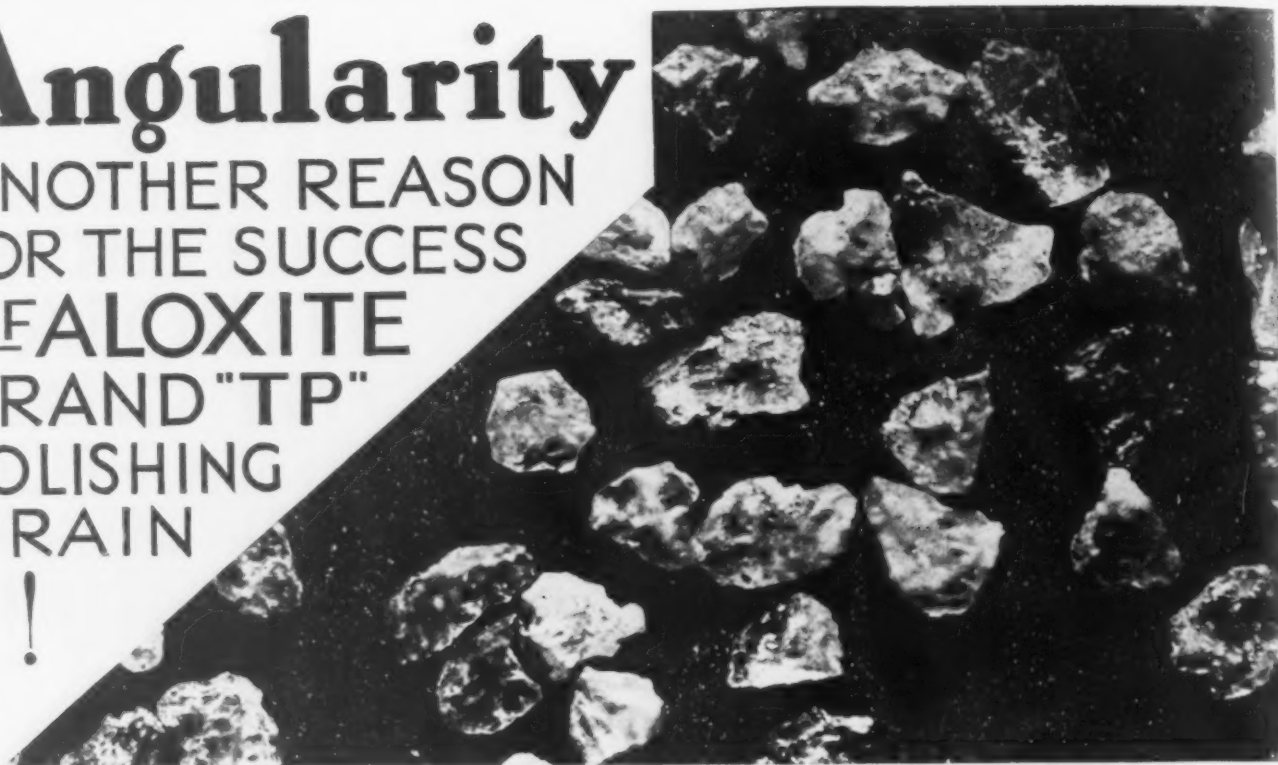
The CLEVELAND PLANER COMPANY
Established 1900

3148 Superior Ave., Cleveland, Ohio

Angularity

ANOTHER REASON
FOR THE SUCCESS
OF ALOXITE
BRAND "TP"
POLISHING
GRAIN

!



HOW "TP" LOOKS UNDER THE MICROSCOPE

WE could produce an abrasive grain round like the sands of the sea, or like marbles or lead shot—every particle or granule the same size, giving a 100% screen test for true size.

But it wouldn't be worth a hang to the polisher.

Such a grain wouldn't cut on a set-up wheel. The polisher must have a grain that will give him a "keen" polishing wheel.

That's why "TP"—every granule of it—is angular—sharp—clean cutting.

It gives a real cutting action in whatever

direction the work is presented to the wheel.

"TP" is easy to handle in setting up because of the rapid and effective action of its high capillarity.

The coated wheel shows long life because of "TP's" Surface Tenacity—its holding power which anchors the grain in place until worn out.

Remember too, that the hard, sharp, tough "TP" is free from the lazy plates and splinters—that it packs as it should pack on the set-up wheel.

What more could you ask of a polishing grain?

ALOXITE

REG. U. S. PAT. OFF.

BRAND

"TP" POLISHING GRAIN

IT HOLDS, WHILE IT CUTS, WHILE IT POLISHES

[WORKING SAMPLES FOR THE ASKING]

THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.

REG. U. S. PAT. OFF.

CANADIAN CARBORUNDUM CO., LTD., NIAGARA FALLS, ONT.

SALES OFFICES AND WAREHOUSES IN New York, Chicago, Boston, Philadelphia, Cleveland, Detroit, Cincinnati, Pittsburgh, Milwaukee, Grand Rapids, Toronto, Ont.
The Carborundum Co., Ltd., Manchester, England Deutsche Carborundum Werke, Reisholz bei Dusseldorf, Germany

(CARBORUNDUM AND ALOXITE ARE REGISTERED TRADE MARKS OF THE CARBORUNDUM COMPANY)

THESE INDUSTRIES USE

MEAKER FULL AUTOMATIC PLATING MACHINES



Profitably —

IN FACT you will find them used by the quantity producers of plated parts in any field because of their greater economy in production and the merchandising value of the superior finished product that they turn out.

In addition to the fact that Meaker Full Automatic Plating Machines use two-thirds less floor space than hand tank plating equipment, they also increase production. Besides reducing costs (one user saved as much as 89%), they make it possible for one man to do as much work as 10 or 20 men, greatly reducing direct labor charges.

Ordinarily, Meaker Full Automatic Plating Machines **pay for themselves in less than a year**, and continue to pay year in and year out. Meaker Full Automatic Machines are built to suit your many requirements and you are not asked to change your production to fit the machine.

We would like to present facts and figures to all producers of plated parts, especially to quantity producers. Send us your samples, specifications, and blue prints. Let our engineers study the problem and make recommendations with estimate as to cost.

- Meaker Automatic Machines are adaptable to chromium plating. Interesting bulletin on Full Automatic Plating Machines sent on request. •

THE MEAKER COMPANY

1619 South 55th Avenue (Cicero Station), Chicago, Illinois

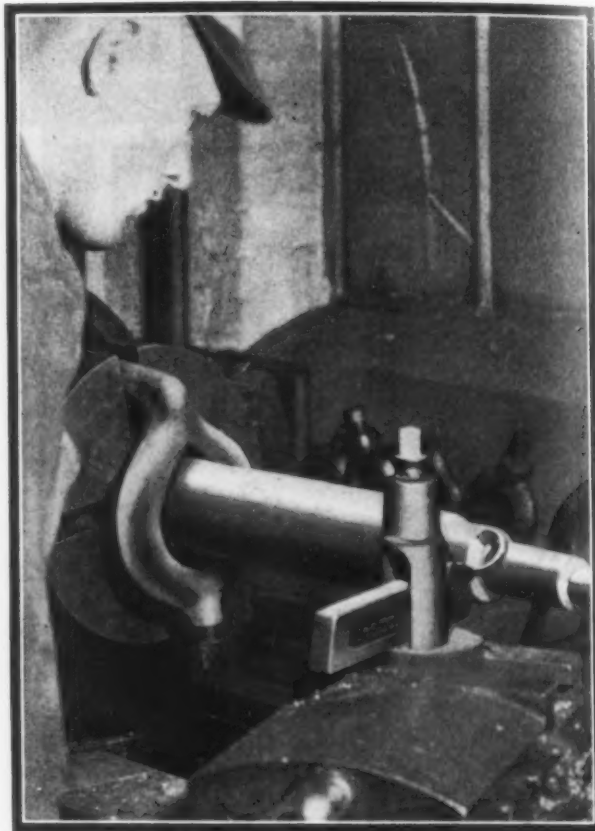


ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms



Improved Designs,
Selected Materials,
Accurate Manufacture
...all are found in

ARMSTRONG Drop Forged Tools



The reputation of ARMSTRONG Drop Forged Tools has been built on that basis. Study of any ARMSTRONG Tool will reveal extra thought in creation, points of fineness developed in test laboratories, evidence of deliberate manufacture. Take ARMSTRONG Drop Forged Lathe Dogs or ARMSTRONG "C" Clamps for example—alloy steel screws, hardened at the point; oversize hubs that permit re-tapping. Extra care here, extra quality there—in all, evidence of a complete knowledge of a tool's requirements and a sincere effort to build tools that will meet them.

Every facility is furnished that will contribute to the uniform quality and excellence of ARMSTRONG Tools—modern machines, modern methods and skilled men. ARMSTRONG Tools are not made by

harassed or hurried pieceworkers. They are products of true craftsmen, skilled artisans who take pride in their workmanship, fathers and sons, brothers, warm friends working side by side, all imbued with ARMSTRONG Ideals of Tool Quality, all carefully guarding the ARMSTRONG Reputation for fine tools.

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"

309 N. Francisco Avenue, CHICAGO, U. S. A.



ARMSTRONG DROP FORGED LATHE DOGS

12 types, all practical sizes:
Square Head, Headless, or
Safety, Straight or Bent, Tails.
They never fail and have a
double life.



ARMSTRONG

Tool Holders

Lathe Dogs "C" Clamps
Ratchet Drills
High Speed Steel Bits
Drop Forged Wrenches
Chain Pipe Wrenches
Pipe Wrenches

ARMSTRONG BROS.

Solid Dies and Stocks
Adjustable Dies and Stocks
Ratchet Stocks
Triplex Stocks
Pipe Cutters
Chain Vises
Hinged Pipe Vises
Knife Blade Cutter Wheels



WRITE
for Catalog
B-27. Shows,
describes and
prices all
ARMSTRONG
Tools.

ARMSTRONG

TRADE MARK REG. IN U.S. PAT. OFFICE

THERE'S AN OAKITE SERVICE MAN NEAR EVERY INDUSTRIAL PLANT

Use this NATION-WIDE OAKITE cleaning service!

AN Iowa washing machine manufacturer spent \$400.00 a month cleaning parts before painting. An Oakite Service Man called and said that with his materials and methods he could lower costs and improve results.

And the promise was generously filled! In the first four months of Oakite cleaning, the saving averaged \$190.00 a month. Parts go to the paint department cleaner than ever before. The fire danger of the former method has been eliminated. Savings made practically pay for all the cleaning material used.

How frequently, in the records of Oakite performance, do we find stories like this! A similar instance occurred in a Massachusetts plant making small arms. The job was removing oil and grease from rifle barrels, before the bluing operation. The old method required an hour in boiling soda, and another half hour in a boiling rinse. By the Oakite method, twenty minutes in an Oakite solution and a ten minute rinse does a better job, and costs are cut nearly one third!

Not only for cleaning, but also for related operations, such as rust-prevention, paint-stripping, and cutting and grinding, Oakite materials are serving industry everywhere. For example, a plant in far-west Washington tried Oakite Grinding Compound on one of their internal grinders on manganese steel. The difference was noticeable at once in smoother work and less loading of the wheel. Within a week every grinder, lathe, miller and gear cutter in the shop was supplied with the proper Oakite Grinding or Cutting Compound . . . assuring less frequent grinding of tools and dressing of wheels, keeping work and machines clean, improving work, and lowering costs.

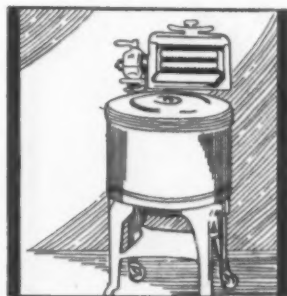
Oakite Service is nation-wide. One of our representatives is located near you, ready at all times to drop in and discuss the benefits of these modern materials and methods. Send for booklets "Modern Metal Cleaning" and "Modern Cutting and Grinding".

OAKITE PRODUCTS, INC., 20 Thames St., New York, N. Y.

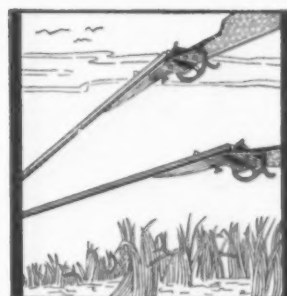
OAKITE

TRADE MARK REG. U.S. PAT. OFF.

Industrial Cleaning Materials and Methods



IOWA



MASSACHUSETTS



WASHINGTON

Oakite Service Men, cleaning specialists, are located in the principal industrial centers of the United States and Canada.

THERE'S AN OAKITE MATERIAL FOR EVERY KIND OF CLEANING

Berjo

The Vise with
the Educated Jaws



Bench Vise

The jaws of the Berjo Vise adjust themselves automatically to any irregular shape and hold it firmly. No jigs or fixtures necessary.

Positive action. Nothing to break or wear out. A number of sizes available. Write for details.

The
AVEY DRILLING MACHINE CO.
Cincinnati, Ohio

Cone 4-Spindle Automatics

Are economical and accurate producers of screw machine parts up to 4 3/8" to 7" milling length. They cut costs, increase production, boost profits.

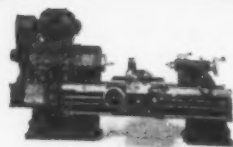
Write for particulars

CONE AUTOMATIC MACHINE CO., Inc.
WINDSOR, VERMONT

REPRESENTATIVES:

Detroit: J. C. Austerberry's Sons, 684 E. Congress St., Detroit, Mich.
Chicago: John H. Glover, 2127 North Sayre Ave., Chicago, Ill.
Ohio: S. B. Martin, 3348 Superior Avenue, Cleveland, Ohio.
New England: Potter & Johnston Machine Co., Pawtucket, R. I.
Indiana: G. A. Richey, Chamber of Commerce Bldg., Indianapolis, Ind.
New York State: Syracuse Supply Co., Syracuse, N. Y., also Rochester, N. Y.
Pennsylvania: Arch Machinery Co., 1005 Park Bldg., Pittsburgh, Pa.
Philadelphia: Lloyd & Arms, Inc., 133 South 36th St., Philadelphia, Pa.
California: C. F. Bulotti Machinery Co., 829-831 Folsom St., San Francisco, Calif.

CONFIDENCE

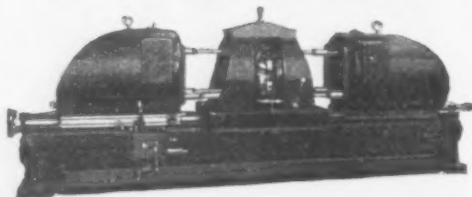


USERS have confidence in Monarch Helical-gear Timkenized Lathes because they are guaranteed to give complete satisfaction. Write for 44-page catalog No. 132.

THE MONARCH MACHINE TOOL CO.
Sidney, Ohio, U. S. A.

Monarch Lathes
Helical Gears - Timken Bearings
SMOOTHER... QUIETER... MORE POWERFUL

BARNES



PRODUCTION DRILLING MACHINES

Established 1872

W. F. and John Barnes Co.
Rockford, Illinois

LATHES-TOOL ROOM GRINDERS



THE
R.K. LE BLOND MACHINE TOOL CO.
CINCINNATI, OHIO.

J&L

JONES & LAMSON
See Page
Facing Reading
September 25 Issue

Hartness Flat Turret Lathes
Hartness Automatic Die Heads
Hartness Screw Thread
Comparator
Fay Automatic Lathes
Flanders Ground Thread Taps

JONES & LAMSON MACHINE CO.
Springfield, Vermont, U. S. A.
19-21 Water Lane, Queen Victoria Street,
London, E. C.

CINCINNATI LATHES

Judge engine lathes by past performance. Have us show you what the latest Cincinnati can do on your work. There is a size for every job—from 16" to 32"; cone or geared head; belt or motor drive; with standard or special attachments; also tooling equipment if needed for your specific requirements. We tool up complete for production, manufacturing or tool room work. Specialists 25 years.

THE CINCINNATI LATHES & TOOL CO.
OAKLEY, CINCINNATI, OHIO, U. S. A.

BAKER

Vertical Boring and
Drilling Machines
Cylinder Bore
Keyseaters


BAKER BROTHERS, Inc.
TOLEDO OHIO, U. S. A.

LATHES
RADIALS
SHAPERS

The AMERICAN TOOL WORKS CO.

CINCINNATI U.S.A.

LANDIS ROLL GRINDER



SMOOTH POWERFULL
ECONOMICAL
FLEXIBLE
TRAVERSED BY
HYDRAULIC POWER
ACCURATE
ECONOMICAL
SMOOTH

LANDIS TOOL COMPANY

WAYNESBORO, PA.

DETROIT

CHICAGO

L

NEWARK

PHILADELPHIA

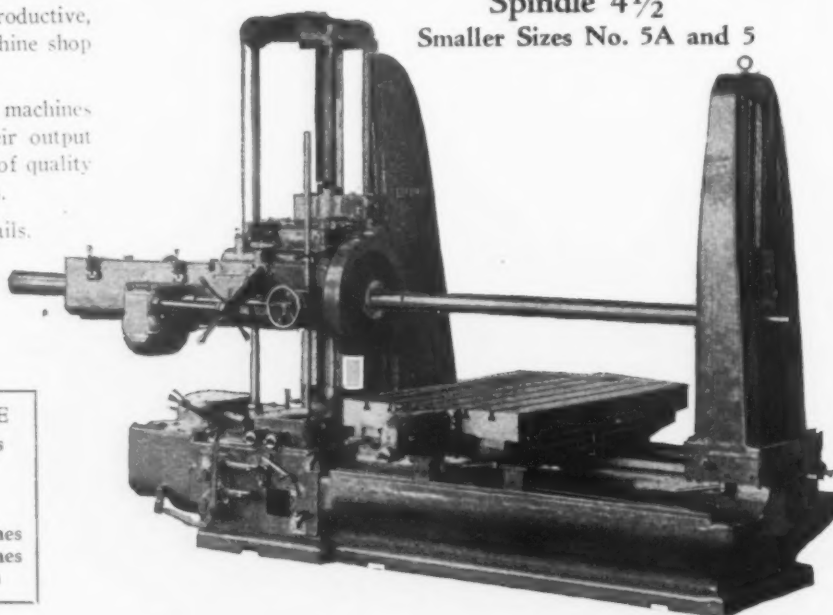
The DEFIANCE No. 6 Boring, Milling, Drilling and Tapping Machine

Versatile, accurate, highly productive, the Defiance No. 6 is a machine shop in itself.

Those who are using these machines have increased not only their output but have set a new standard of quality and accuracy in their shops.

Let us give you further details.

THE DEFIANCE LINE
Cylinder Boring Machines
Heavy Service Drilling
Machines
Rail Drills
Multiple Drilling Machines
Multiple Tapping Machines
Valve Grinding Machines



Spindle 4 1/2"
Smaller Sizes No. 5A and 5

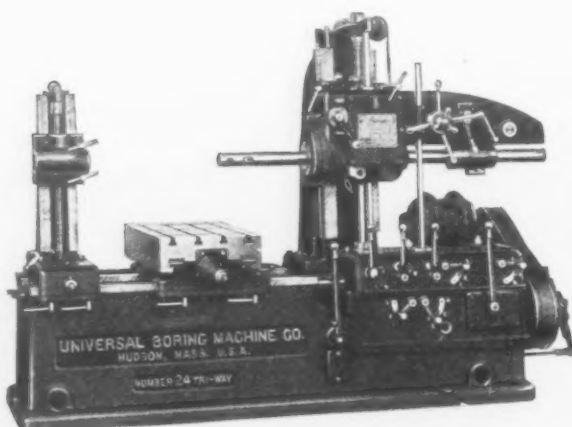
THE DEFIANCE MACHINE WORKS, Defiance, Ohio

Designers and Builders of Precision-Production Machine Tools

ESTABLISHED IN 1850

UNIVERSAL (HORIZONTAL) BORING MACHINE TRI-WAY TYPE

For Tool Room Work
and large production



UNIVERSAL BORING MACHINE CO.
HUDSON, MASS., U. S. A.

"Where Accuracy Counts, We Win" 3007

LUCAS "PRECISION"

Horizontal Boring, Drilling and Milling Machine
LUCAS POWER FORCING PRESS

THE LUCAS MACHINE TOOL CO.

Cleveland

Ohio, U. S. A.

The Improved No. 3 Lapointe Duplex Broaching Machine

Guaranteed to pay for itself in one year's time by increased production.

LAPOINTE MACHINE TOOL COMPANY

Hudson, Mass., U. S. A.

BROACHING TOOLS and BROACHING MACHINES

OF ALL SIZES AND DESCRIPTIONS

Quality and Service

AMERICAN BROACH & MACHINE COMPANY
Ann Arbor, Michigan

MILWAUKEE MILLING MACHINES MILWAUKEE MIL PRODUCTION MILLERS

**KEARNEY & TRECKER
CORPORATION**

1930 NATIONAL AVE

MILWAUKEE WIS

SPLINE MILLING MACHINES
VERTICAL MILLING MACHINES
SENSITIVE DRILLING MACHINES
PRESSES (FOOT AND POWER)
WET TOOL GRINDERS
SPECIAL MACHINERY

*Send for descriptive circulars of
these high production machines*

THE TAYLOR & FENN COMPANY
HARTFORD, CONN., U. S. A.

Gray Planers

FOR MAXIMUM SERVICE

Double-Housing Openside and Switch Planers

The G. A. Gray Co., Cincinnati, Ohio

SHAPERS and GEAR CUTTING MACHINES

GOULD & EBERHARDT

ESTABLISHED 1833
NEWARK, N. J., U. S. A.

SHAPERS

simply designed
but accurate and
efficient

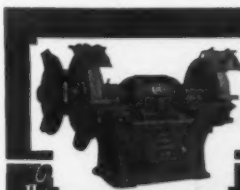
12-in. to 32-in. Stroke (inclusive)

THE SMITH & MILLS COMPANY

Cincinnati, Ohio, U. S. A.

*For True Economy in Flat
Surface Finishing, Investigate*
Gardner Disc Grinders

Gardner Machine Company
412 E. Gardner St., Beloit, Wis., U. S. A.



The Cincinnati
ELECTRIC GRINDERS - BUFFERS
PORTABLE ELECTRIC TOOLS

Write for complete catalog
The CINCINNATI ELECTRICAL TOOL CO.
CINCINNATI, OHIO, U. S. A.

Blanchard Vertical Surface Grinders for production and accuracy.

BLANCHARD GRINDERS

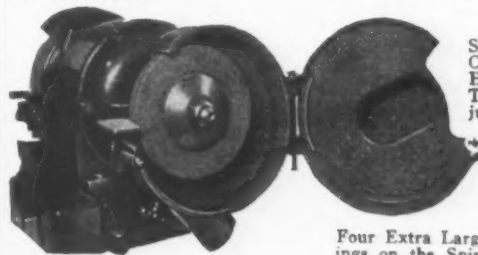
BLANCHARD MACHINE CO.
STATE ST., CAMBRIDGE, MASS.

BLANCHARD

BLACK & DECKER HEAVY DUTY GRINDERS

Electric Cast Steel Guards
Automatically Adjustable
to Wheel Wear.

ARE SAFE!



Spark Lip and
Chip Breaker
Hugs Wheel as
Tool Rest is ad-
justed.

Four Extra Large Ball Bearings on the Spindle.

No Vibration—Heavy Construction of Best Materials.

THE BLACK & DECKER MFG. CO.
Towson, Maryland

THOMPSON UNIVERSAL GRINDING MACHINES

Combine in a single machine facilities for every possible grinding operation required in a machine shop. Write for Bulletin No. 18.

THE THOMPSON GRINDER CO.

1534 WEST MAIN ST.

SPRINGFIELD, OHIO



CENTERLESS BELT POLISHER FOR LIGHT PRODUCTION WORK

(Swings to Horizontal Position when Desired)

Combines—a Centerless Feed Grinding and Polishing Machine, an Internal Grinder or Polisher, and a Vertical or Horizontal Surfer or Polisher. Ball Bearings. Ask for catalog.

PRODUCTION MACHINE CO.

Greenfield, Mass.



Ball Bearing Dry Grinder

THE SPRINGFIELD MFG. CO.

321 Mountain Grove Ave.,
BRIDGEPORT, CONN.

Send for Blue Catalogue



Standard Ball Bearing Grinders and Buffers

Made in sizes from 1/4 H.P. to 10 H.P.
Drills, Center Grinders, Hand Grinders.

Write for Catalog and Price List.

The Standard Electrical Tool Co.
1948 W. Eighth St., Cincinnati, Ohio

ABRASIVE SURFACE GRINDER

Either Horizontal or
Vertical Spindle
Type
Countershaft or
Motor Drive

Get our bulletin for particulars

ABRASIVE MACHINE TOOL CO., East Providence, R. I.



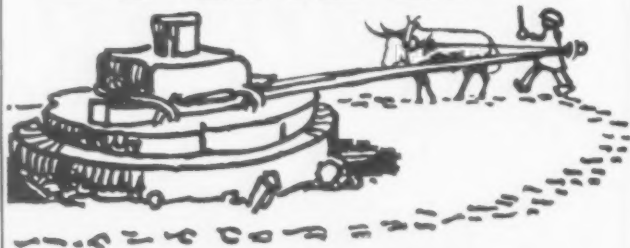
STERLING ABRASIVES

AND STERLING GRINDING MACHINES

THE STERLING GRINDING WHEEL CO.

Abrasive Division of The Cleveland Quarries Co.
Factory and Office, Tiffin, Ohio
Branch at 23 S. Jefferson St., Chicago

GRINDING

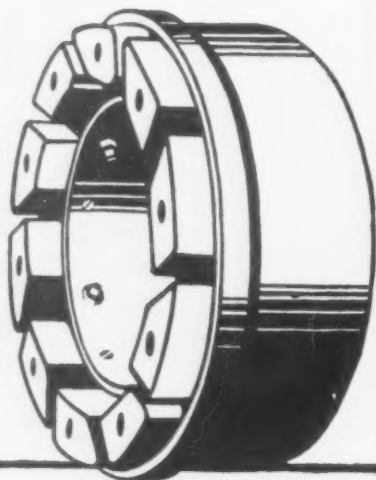


The introduction of Bridgeport Sectional Grinding Wheels was a gigantic forward step in efficient, economical surface grinding. They cut fast and cool for they provide a "way out" for the material ground off, and when worn the segments are easily and quickly moved forward in the steel chuck assuring a maximum of wheel service and economy.

Bridgeport Sectional Wheels are made for many makes of grinders. They're used not only for grinding steel and iron, but terra cotta, clay blocks and refractory shapes as well. If you use grinding wheels on flat surfaces, ask us to send complete details.

THE BRIDGEPORT SAFETY EMERY WHEEL CO., Inc.

1284 W. Broad St.
Bridgeport, Conn.



BRIDGEPORT

The KELLERFLEX

BK-1 WITH HIGH SPEED ATTACHMENT
FOR GRINDING HARDENED SURFACES

The KELLERFLEX Machine with the High Speed attachment triples its usefulness in the shop. This unit, with a speed range from 875 to 11,000 RPM., permits the use of rotary files at comparatively low speeds; grinding wheels, wire brushes, rubber polishing wheels at their normal speeds; and small grinding wheels, pencil stones, shaped wheels, etc., at such speeds that will increase their cutting efficiency and prevent them from wearing down unevenly.

There are smaller KELLERFLEX units for more delicate work and larger machines for heavy duty grinding.

Illustrated machine has grinding wheel capacity $\frac{1}{2}$ " to 3".

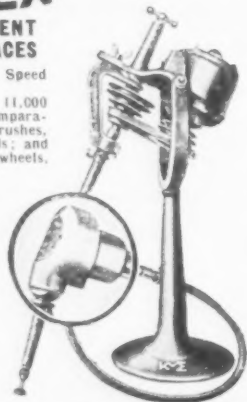
Let us tell you how the High Speed Attachment and the KELLERFLEX Machine can be successfully applied to your needs.

KME

KELLER MECHANICAL
ENGINEERING CORP.

78 Washington St., B'klyn, N. Y.

Complete Stock at Chicago and Brooklyn



ECONOMY HEADQUARTERS
FOR BOLT & CAP SCREW
MACHINERY
ENGINEERING CO. POINTING-THREADING
& SHAVING MACHINES
WILLOUGHBY-OHIO Write for Catalog

17 STYLES AND SIZES
MERRILL
PIPE THREADING **BETTER** MACHINES
TOLEDO, OHIO

Pipe Threading, Tapping and Cutting Machinery

THE PIPE MACHINERY CO.

930 E. 70th St.

Cleveland, Ohio

Curtis

Pipe Cutting and
Threading Machines
give Economy

Hand—Belt—Electric
Ranges $\frac{1}{4}$ "-2" to 8-16"

The Curtis & Curtis Co.

327 Garden St. Bridgeport, Conn.
Most Threads Per Dollar Invested

SAUNDERS PIPE THREADING and CUTTING MACHINES

In sizes from $\frac{1}{4}$ " to 18" inclusive
Motor or belt driven. Catalogue on request

D. Saunders' Sons, Inc., Yonkers, N. Y.

The Hurlbut-Rogers Cutting-off Machine

Will Double Your Output

Equipped with two tools, cuts twice as fast.

Made in six sizes—two types of drive.

Send for descriptive catalog.

The Hurlbut Rogers Machinery Co.

NASHUA, NEW HAMPSHIRE

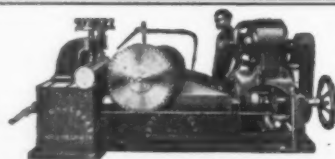
Cutting-Off Machines

—for thin and thick wall steel tubing and bars

BARDONS & OLIVER

Cleveland, Ohio

We also manufacture a large line of turret machinery for finishing cast iron, steel and brass.



Cutting Off
Machines for
Sawing All Kinds
of Metals

THE ESPEN-LUCAS MACHINE WORKS

FRONT AND GIRARD AVE.

PHILADELPHIA, PENNA.

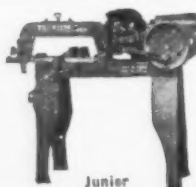
COCHRANE-BLY CO.

ROCHESTER, N. Y.

METAL SAWING MACHINES

SAW SHARPENING MACHINES

DIE SHAPERS & FILING MACHINES



Junior

METAL CUTTING

There are Racine Machines for every metal cutting job.

The Sheer Cut for Production Work.

The High Speed Saw for Regular Cutting.

The Band Saw for Wood and Metal.

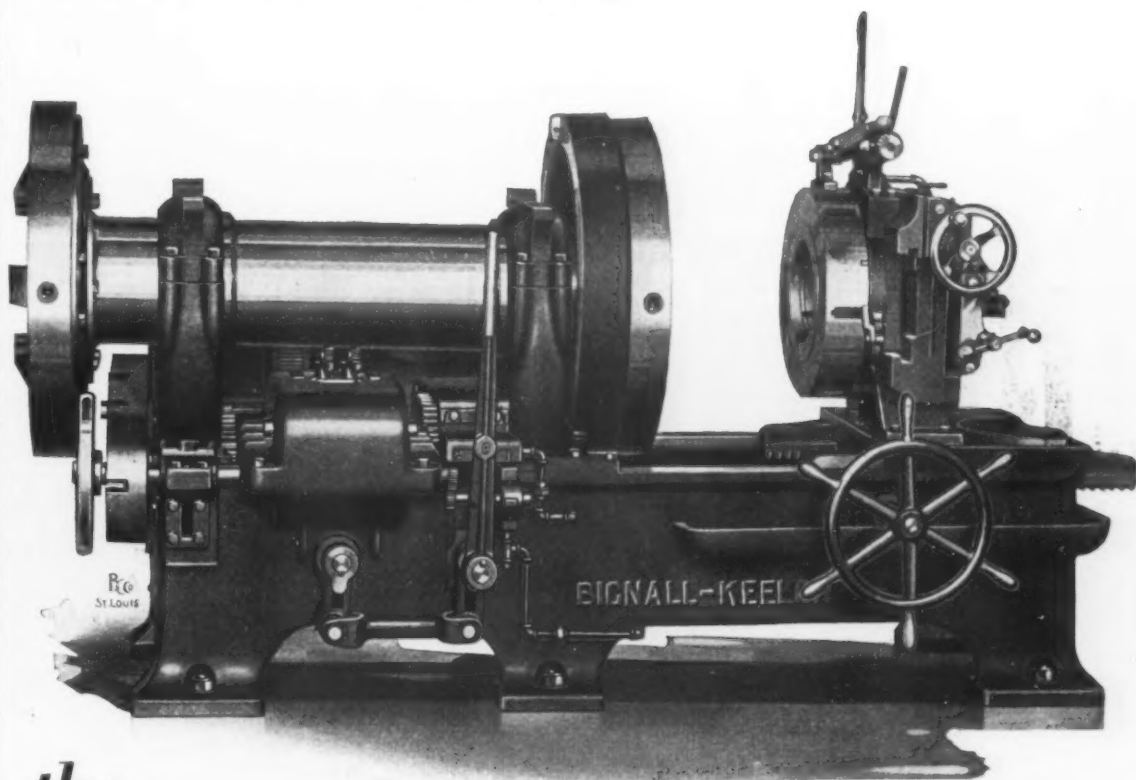
The Abrasive Cutter for Hardened Steels.

Accuracy, speed and long life are inherent characteristics of this equipment. Write.

RACINE TOOL & MACHINE CO.

1755 State Street, Racine, Wis.

ANNOUNCING



*the
improved -*

No. 8 DUPLEX PIPE THREADING MACHINE

In the past 50 years, the untiring efforts of B. & K. engineers have brought about many improvements in the construction of heavy duty threading equipment. The Improved No. 8 Duplex Pipe Threading Machine is their latest contribution to greater threading efficiency and economy.

Eight speed changes. Two-way, positive clutch—fast and slow positions—quick start and stop—quick shift to higher speed for cutting operations. Three-jaw Independent Chuck mounted on each end of arbor—jaws with tempered tool steel grippers. Special flange grippers on rear chuck. Ample power for cutting long tapered threads to any standard at one pass. 10" hole through spindle, will handle all sizes of pipe and casings from 2½" to 8¼". Belt or motor drive.

Our engineers will be glad to give you the full details. Write them.

**Bignall & Keeler Machine Works
of the N. O. Nelson Mfg. Co.**

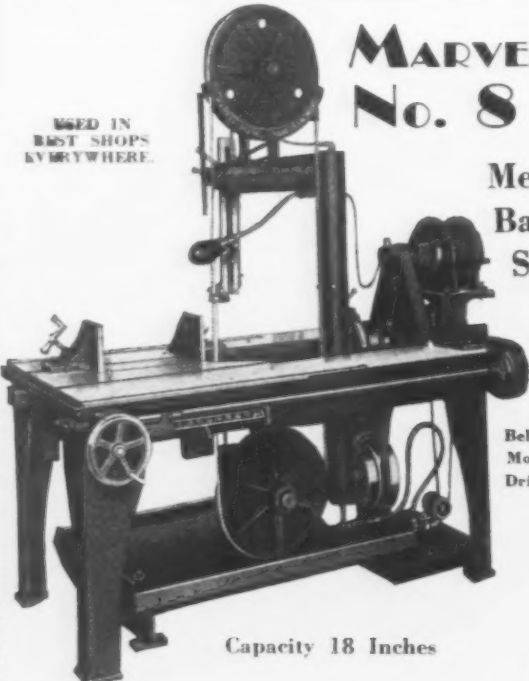
EDWARDSVILLE, ILLINOIS



MARVEL No. 8

USED IN
BEST SHOPS
EVERYWHERE.

**Metal
Band
Saw**



Belt or
Motor
Driven

Capacity 18 Inches

Here is a thoroughly efficient saw. Known for its ease of operation, accuracy and economy. It is absolutely an all-purpose saw doing either large or small jobs with equal speed and economy. Designed to cut square or at any angle up to 45 degrees, right or left. This saw is standard equipment in many of the largest shops.

Write for complete information.

Armstrong-Blum Mfg. Co. 349 N. Francisco Ave., Chicago, Ill.

Peerless Metal Sawing Machinery

This **PEERLESS VERTICAL TYPE HEAVY DUTY METAL SAWING MACHINE** operates dependably and economically. Capacity from 16" to 24", open work table out in front of Blade. Blade operates up and down. Designed for efficient sawing of heavy bars, billets, die-blocks, etc. Also **PEERLESS STANDARD TYPE AND PEERLESS UNIVERSAL TYPE HIGH SPEED METAL SAWING MACHINES** in 6" to 13" capacities.



Peerless Machine Co., 1218-16th Street, Racine, Wis.
New York Office, 15 Warren Street

**Twist Drills—Hobs
Milling and Gear Cutters
Reamers—Carbon or
High Speed Steel**

*Specialists in laying out and designing
Cutters for production work.*

UNION TWIST DRILL CO.
ATHOL, MASS.

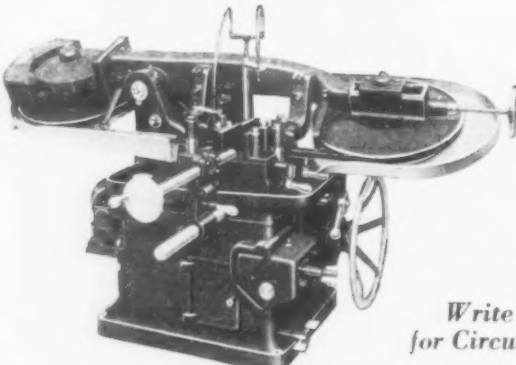
STOP THAT WASTE!

CROOKED CUTS WASTE
TIME and MATERIAL

Waste Costs Money!
Use

**The MILBAND
Cutting-Off Machine**

ACCURACY and SPEED



*Write
for Circular*

THE AVEY DRILLING MACHINE CO.
Cincinnati, Ohio

Twist Drills
Reamers

See our advertisement in
the September 18th issue

Screw
Extractors

THE CLEVELAND TWIST DRILL COMPANY
CLEVELAND
NEW YORK CHICAGO LONDON
SAN FRANCISCO

BARBER-COLMAN

CUTTERS·HOBS·HOBGING MACHINES
HOB SHARPENING MACHINES...
REAMERS·REAMER SHARPENERS

BARBER-COLMAN COMPANY GENERAL OFFICES AND PLANT
ROCKFORD, ILLINOIS, U.S.A.

"HOPKINS" PREFERRED EQUIPMENT

Pneumatic Series "C" Air Cylinder



SERIES B also available and similar to above except control is by operating valves. Box pistons utilize every bit of compressed air introduced into cylinders. Only 5 packings to every cylinder, each automatically concealed by compressed air, thus eliminating all adjustable packing glands.

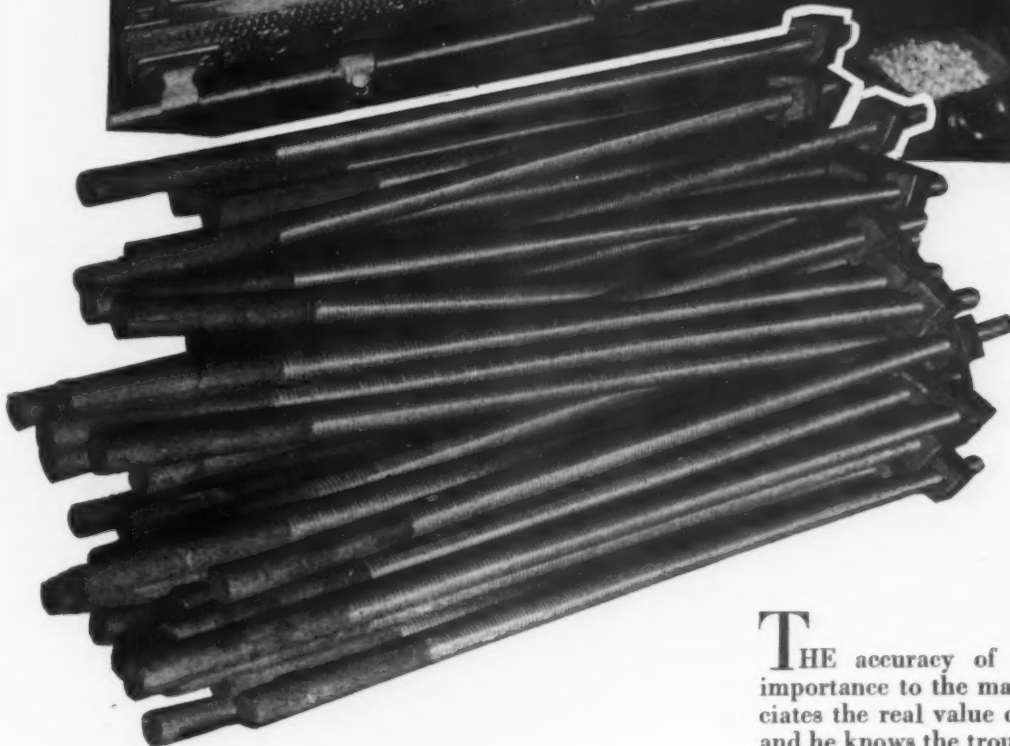
Write for catalog and prices

The TOMKINS-JOHNSON CO.
JACKSON, MICH.
Representatives in All Principal Cities

ACME, THE ACCURATE THREADER



This Acme Threader was installed 25 years ago in a well-known manufacturing plant and is apparently good for another quarter of a century.



May we send some further information?

THE ACME MACHINERY CO.
COR. ST. CLAIR AND HAMILTON STS., CLEVELAND, OHIO

DETROIT OFFICE: 5185 LORAIN ST.

FOREIGN AGENTS: Burton, Griffiths & Co., London, England;
Glanzer & Perreaud, Paris, France; Ing. Ercole Vaghi, Milan, Italy.

THE accuracy of his threader is of vital importance to the man who runs it. He appreciates the real value of a clean, accurate thread and he knows the trouble an inaccurate machine can cause.

This ACME Threader has twenty-five years of accurate service to its credit, and its operator is justly proud of the fact that its twenty-fifth year was as accurate as its first.

From a 6" tie rod to a 1/2" stud, there is an ACME THREADER made to cut cleanly, accurately, and rapidly. Wise shop owners know this and equip new shops or replace worn-out threaders with durable ACME Threaders.

BRUBAKER

Quality Taps for Fast Accurate Tapping

Brubaker Machine Screw Taps may be had singly or in sets of taper, plug and bottoming, like hand taps. Correctly designed; true in pitch, lead and diameter, they cut fast with minimum breakage and insure tapping accuracy.



W. L. Brubaker & Bros. Co.

Factory: MILLERSBURG, PA.

Catalogs 6 and 6-A show the full line of Brubaker Taps with prices. Let us send them.

Sales Office

50 Church St.

New York, N. Y.

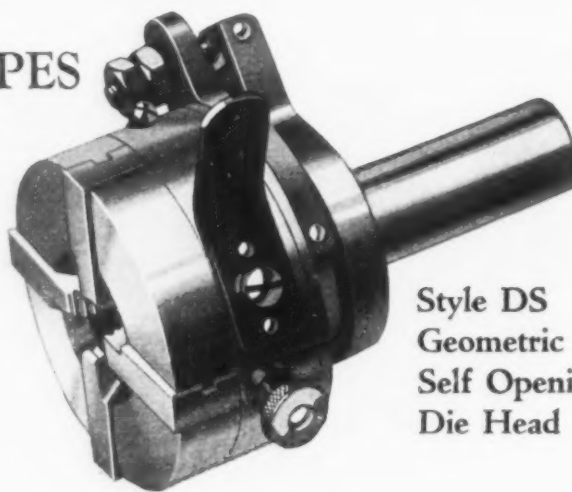
FOR BROWN & SHARPES

Brown & Sharpe Automatics of today operate at whirlwind speeds. A Die Head to function on such a machine must be sturdy to stand up under the millions of indexings, yet it must be extremely sensitive to cut fine pitch threads of small diameters without stripping.

Geometric has a Die Head built to meet just such conditions. It is the Style DS.

The Chasers are cam operated, therefore positive. The Head is sturdy and strong. A floating shank and an adjustable trip make possible sensitive tripping and assure you of concentric threads, threads of precise lengths without the use of close camming.

Thousands in daily use. Try one on your Brown & Sharpes.



**Style DS
Geometric
Self Opening
Die Head**

THE GEOMETRIC TOOL COMPANY

New Haven, Conn.

Makers also of Collapsing Taps, Solid Adjustable Taps and Threading Machines

Drills Cutters Reamers Taps and Dies



**MORSE Quality means
better performance
from them all.**

The essential qualities which make for long life between sharpenings, and thereby give you economical production, are present in all cutting tools which bear the name MORSE.

The same careful selection of steel, the same rigorous inspection, the same mastery of heat treating methods make every Morse Tool a reliable factor in speedy production.

The Morse Line
includes
High Speed and Carbon

DRILLS
REAMERS
CUTTERS
TAPS AND DIES
SCREW PLATES
ARBORS
CHUCKS
COUNTERBORES
MANDRELS
TAPER PINS
SOCKETS
SLEEVES

MORSE

TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASS., U.S.A.



DIE HEADS

A Liberal Offer to cut Your Threading Costs NOW!

Take advantage of the Eastern Machine Screw Co.'s offer to send you an H & G Die Head *on approval for 30 days*. Put it to work in your own shop, test it under your own conditions. Let it prove to you that you can cut your threading cost by lining up with these superior H & G features.

- Better quality threads ♦ ♦ ♦
- ♦ ♦ ♦ Longer life chasers
- ♦ Higher production speeds ♦
- Freedom from threading annoyances

We are making it possible for you to invest in a sure thing. Simply let us know size and type of machine and a description of the thread.

All of the many styles of H & G Die Heads and Threading Machines are alike designed to increase earning capacity through consistent and efficient operation.

Just a line on your company letterhead will promptly bring your copy of the "Threaded Part Data Book," which contains valuable information in connection with the manufacture of threaded parts.

The EASTERN MACHINE SCREW CORPORATION

TRUMAN & BARCLAY STS.,
NEW HAVEN, CONN.



MURCHEY Self-Opening Die Head

Especially adapted to precision work. Chasers easily removed without taking off cap. Write for details.

MURCHEY MACHINE & TOOL CO.
951 PORTER ST., DETROIT, MICH.

THE SAFETY GRINDING WHEEL & MACHINE CO.

"Since 1892"

Springfield
Ohio



Emery Wheel Dressers

Two Sizes **CUTTERS** Nos. 1-2

We make the regular Huntington (Pattern) for all sizes. Roughing for Nos. 1 and 2. Paragon for No. 1 only.

GEO. H. CALDER, Lancaster, Pa., U. S. A.

Pointers on Buffs for the Purchasing Agent
Copy mailed on request

Divine Brothers Company

Utica, N. Y., U. S. A.

Abrasive Metal Finishing Engineers

A Word of Caution to Users of Diamond Tools

To give satisfactory service a DIAMOND TOOL should be set with a carefully selected whole stone, free from fractures and suitable for the use for which it is intended. Such a tool can be relied upon to give the maximum amount of service with a minimum of wear on the DIAMOND.

THOS. L. DICKINSON, 34 Gold Street, New York City
Successor to John Dickinson Established 1796



METAL SAWS—INSERTED TOOTH SAWS—RIVET SETS— CHISEL BLANKS—HIGH SPEED CUT-OFF MACHINES

For standard or special requirements. Specify HUNTER and insure lower production costs. Ask us for proof

HUNTER SAW AND MACHINE CO.
5660 BUTLER STREET, PITTSBURGH, PENNA.

Atkins SILVER STEEL Metal Cutting Saws, SILVER STEEL Hack Saw Blades, Kwick-Kut Hack Saw Machines and Metal Band Saw Machines give you more for your money. The wise buyer purchases Atkins products.

Send for "Saws in Shop" book.

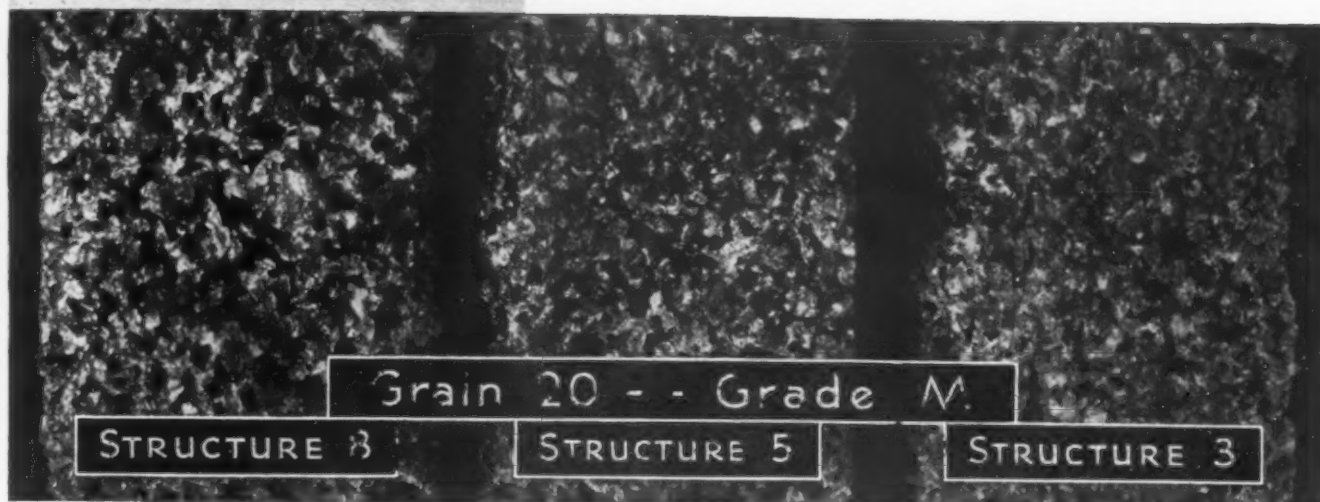
E.C. ATKINS & CO., Indianapolis, Ind.

FOR CUTTING METAL USE DISSTON SAWS

A style and size for every need. Sectional Interlocked and Solid Circular Saws and High Speed Steel Hack Saw Blades.

HENRY DISSTON & SONS, Inc., Philadelphia, U. S. A.

NORTON CONTROLLED STRUCTURE



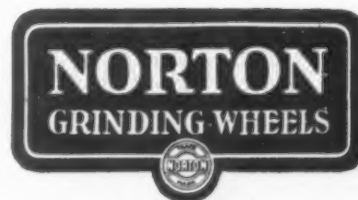
An actual photograph (enlarged) of three wheels identical in grain and grade but different in structure and in grinding action

**Complete Control
of All Five
Characteristics of
a Grinding Wheel**

THE exacting requirements of high production, high precision grinding can now be met more closely than ever before.

The selected wheel of the right grinding action can be precisely duplicated at any and all times.

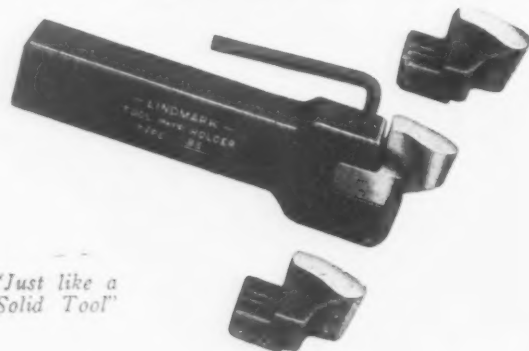
Thus Norton Controlled Structure is an important step in grinding progress. It means that the fifth characteristic of the wheel is now controlled as definitely and accurately as the other four — kind and size of abrasive, kind and strength of bond.



NORTON COMPANY, WORCESTER, MASS.

New York Chicago Detroit Philadelphia Pittsburgh Hartford
Cleveland Syracuse Hamilton, Ont. London Paris Wesseling, Germany

LINDMARK the PRODUCTION HOLDER



"Just like a
Solid Tool"

**Suitable for Boring Mills,
Planers and Heavy Duty Lathes**

The holder supports the bit as near the cutting edge as possible, taking practically all of the strain.

"Stellite" bits are cast for exclusive use with LINDMARK Tool Holders—the Tool Bits are interchangeable.

THE APEX TOOL COMPANY, INC.
50 Remer St., Bridgeport, Conn.

QUALITY COLLETS
AT MASS
PRODUCTION
PRICES

RIVETT
LATHE &
GRINDER CORP.



COLLET CHUCKS

Send for special collet booklet

SIZES FITTING LEAD-
ING MAKES
of BENCH
LATHES
AND
ENGINE
LATHES

BRIGHTON
DISTRICT
BOSTON, MASS.

"LOGAN" Non-Rotating Air Cylinders



One of many air operated devices described at length in the NEW CATALOG S-25. Air Valves, Chucks, Arbor Presses, Ejecting and Reducing Valves, Special Devices. Send for your copy.

THE LOGANSPORT MACHINE CO.
Logansport Indiana

Thor ELECTRIC DRILLS

Built throughout of rugged, easy-running parts. Have the famous Thor Superpower motors. Designed to withstand hard, continuous service day after day, month after month, for years. Made in all sizes and types for every need, for alternating, direct, and high frequency alternating currents. Write for catalog.

Independent Pneumatic Tool Co.
616 W. Jackson Blvd., Chicago

for **FASTEST**
SHEET METAL CUTTING
USE—
TANNEWITZ
HIGH SPEED
BAND SAWS
WRITE FOR BULLETIN - G-H
The TANNEWITZ WORKS
GRAND RAPIDS, MICH.

WHITON LATHE CHUCKS

Complete lines of Independent, Universal and Combination Chucks
Lathe and Drill Chucks
THE D. E. WHITON MACHINE CO.
New London 286 Howard St. Connecticut

The New
CLECO
Ball Bearing
AIR DRILL

CLECO

BALL
BEARING
AIR
DRILLS
Reversible
and
Non-Reversible
for
Drilling
Reaming
Tapping
Flue Rolling
and
Wood Boring

Cleco Drills are very simple in their construction. Every revolving part being mounted upon Ball Bearings permits high operating speed with minimum friction. Crank—Connecting Rods, Valves, Pistons, and Gears are all open in the crank chamber and constantly travel in a continuous bath of good lubricant, insuring long life. Write for catalog No. 30 which fully describes the line.

The Cleveland Pneumatic Tool Co.
3734 E. 78th St., Cleveland, O., U. S. A.

Agents for British Isles
John Macdonald & Co. (Pneumatic Tools), Ltd.
Glasgow, Scotland.



HEATPROOF Compression Riveter DIES



*Shipped
on approval*

These dies are made from our special heat-proof, heat-resisting steel.

They can be used continuously without cooling and will outlast four or more carbon steel dies.

Send us your specifications.

**GEO. F. MARCHANT
COMPANY**

1422 So. Rockwell St., Chicago

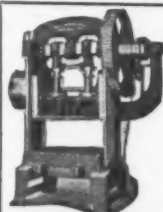


HELWIG MFG. CO.
St. Paul, Minn.

18 in.
Powerful, Sturdy, of Few Parts. Cut with Ease, Close to Work, leaving a Neat Job. Knives cannot wobble. Capacities from $\frac{1}{8}$ " to zero. Also HELWIG Pneumatic and other Hand-operated Time- and Labor-saving Tools having Unique Advantages.

**23,658
HOLES
PER
PUNCH**

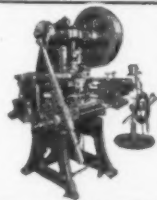
(ALL KINDS, SIZES
AND STANDARDS
SEND FOR FREE SAMPLE)
I. P. RICHARDS CO.
23 Pemberton St., Providence, R. I.
Punches and Dies Since 1868



Robinson Sheet Metal Working Machinery

Inclinable Presses Gap Presses
Double Crank Presses Squaring Shears
Hornling Presses Gap Shears
Toggle Presses Corrugating Machines
Hand and Power Brakes

NEW ALBANY MACHINE MFG. CO.
Sole Owners J. M. Robinson Mfg. Co.
NEW ALBANY, IND.

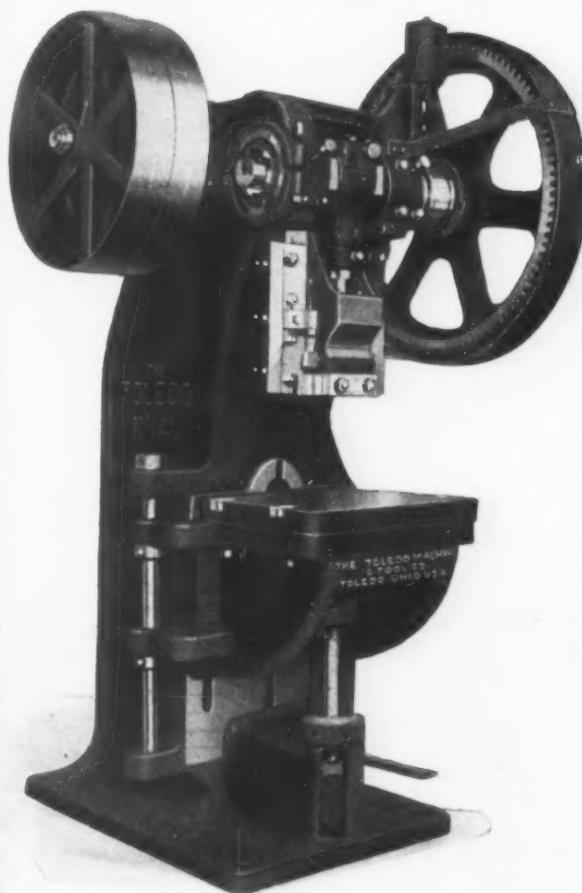


You Can Have 50,000 to 100,000 Pieces Per Day, with Press Speeds of 125 to 250 R.P.M. By Equipping with Littell Roll Feeds. For Feeds Write

F. J. LITTELL MACHINE CO.
4127 RAVENSWOOD AVE., CHICAGO, ILL.

THE "Toledo"

Side Wheel Type
HORNING and WIRING PRESSES



INDISPENSABLE for blanking, forming, horning and wiring operations in manufacturing of pieced tin and stamped ware, and sheet metal work. Built in 15 sizes, weighing from 1,500 to 35,000 pounds. Special bolsters, horns, forces and other devices may be attached.

PRESSES FOR EVERY PURPOSE

Over two thousand patterns from which to choose.

**THE TOLEDO
MACHINE & TOOL CO.**

*Engineers, Founders and Machinists on
Equipment for Sheet Metal Products*

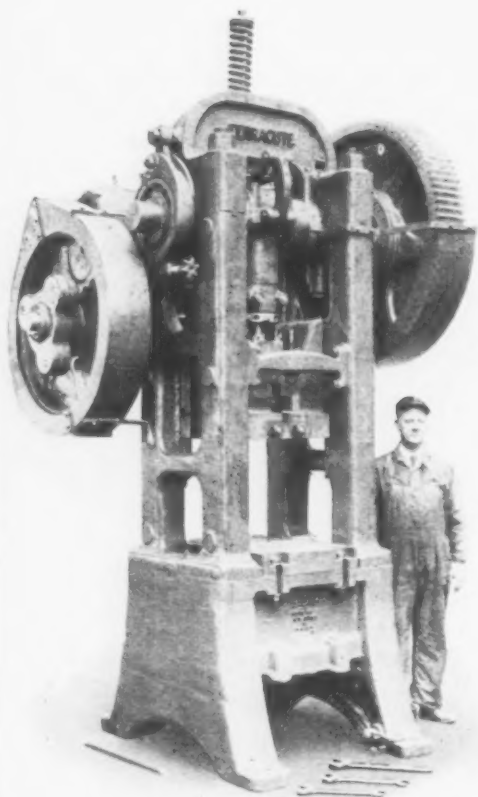
TOLEDO, OHIO, U. S. A.

CHICAGO OFFICE
549 W. Washington Blvd.

DETROIT OFFICE
2-258 General Motors Bldg.

FERRACUTE PRESSES

For METAL STAMPINGS



A tie-rod press that exerts 100 tons pressure—the press shown in the accompanying cut. It is a sturdy, dependable machine which operates with great economy. Equipped with direct motor drive, ram balance, ram knock-out, ram clamp, shearing pin, jaw clutch, and sheet metal guards.

We can show you a cheaper and vastly better method of producing parts from sheet metal and dies. Ferracute Presses are made in many sizes and styles, a correct machine for every class of service.

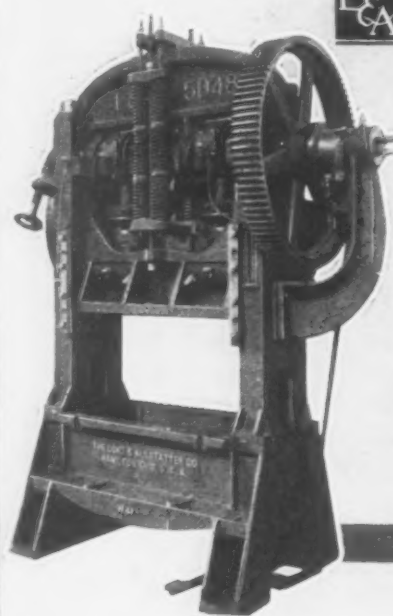
We welcome inquiries

FERRACUTE MACHINE CO.
Bridgeton New Jersey

SPECIAL AGENTS:

Chicago: Neff, Kohlbusch & Bissell
Cincinnati: The E. A. Kinsey Co.
Indianapolis: The E. A. Kinsey Co.
Baltimore: Kemp Machinery Co.
Buffalo: Crane-Schieffer-Owens, Inc.
Rochester: Crane-Schieffer-Owens, Inc.

Oakland: Flanagan Machinery Co.
San Francisco: Flanagan Machinery Co.
St. Louis: Wm. C. Johnson & Sons Mch. Co.
New York: Percy M. Brotherhood & Sons.
Syracuse: Crane-Schieffer-Owens, Inc.
Canada: Canadian Fairbanks-Morse Co., Ltd.



L&A STRAIGHT SIDE TIE ROD PRESS

Single geared with direct motor drive through gearing with silent motor pinion. Self-adjusting brake. Clutch made of .75 carbon steel—four striking surfaces.

The LONG & ALLSTATTER CO.
Hamilton, Ohio, U. S. A.

N I A G A R A

Exclusively Since 1879

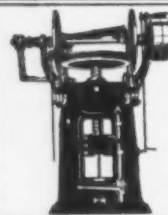
**SHEET METAL WORKING
MACHINES, TOOLS
AND DIES**

POWER PRESSES
PUNCHES
SQUARING SHEARS
AND ROTARY SHEARS

Also complete line of sheet metal
shop machines and tools

Write—

NIAGARA MACHINE & TOOL WORKS • BUFFALO, N. Y., U. S. A.



Patent Percussion Power Presses

The Presses for hot pressed brass parts. Excellent for cold pressing, coining, etc. Also all other types of Power Presses. Up-to-the-minute construction. Fully safeguarded. Automatic feeds.

Zeh & Hahnemann Co., Newark, N. J.

MINSTER POWER PRESSES

Inclinable, Horning, Straight Side,
Punching, Gap, Knuckle Joint and
Screw Presses

THE MINSTER MACHINE CO.
Minster, Ohio, U. S. A.

ANNOUNCING MARQUETTE 4 POINT SUSPENSION PRESS

(PATENTED)

Power is supplied to the slide directly and simultaneously to the four corners instead of through the center line.

- eliminating all side thrust and bending strains developed by the power application principle of ordinary presses
- bringing the slide down with faces precisely parallel to bed of press
- whether the die strains are off center or not
- and keeping the face of the slide parallel with the bed.

Eliminates shearing of dies.

Makes possible more accurate work.

Lowers die maintenance and repair costs.

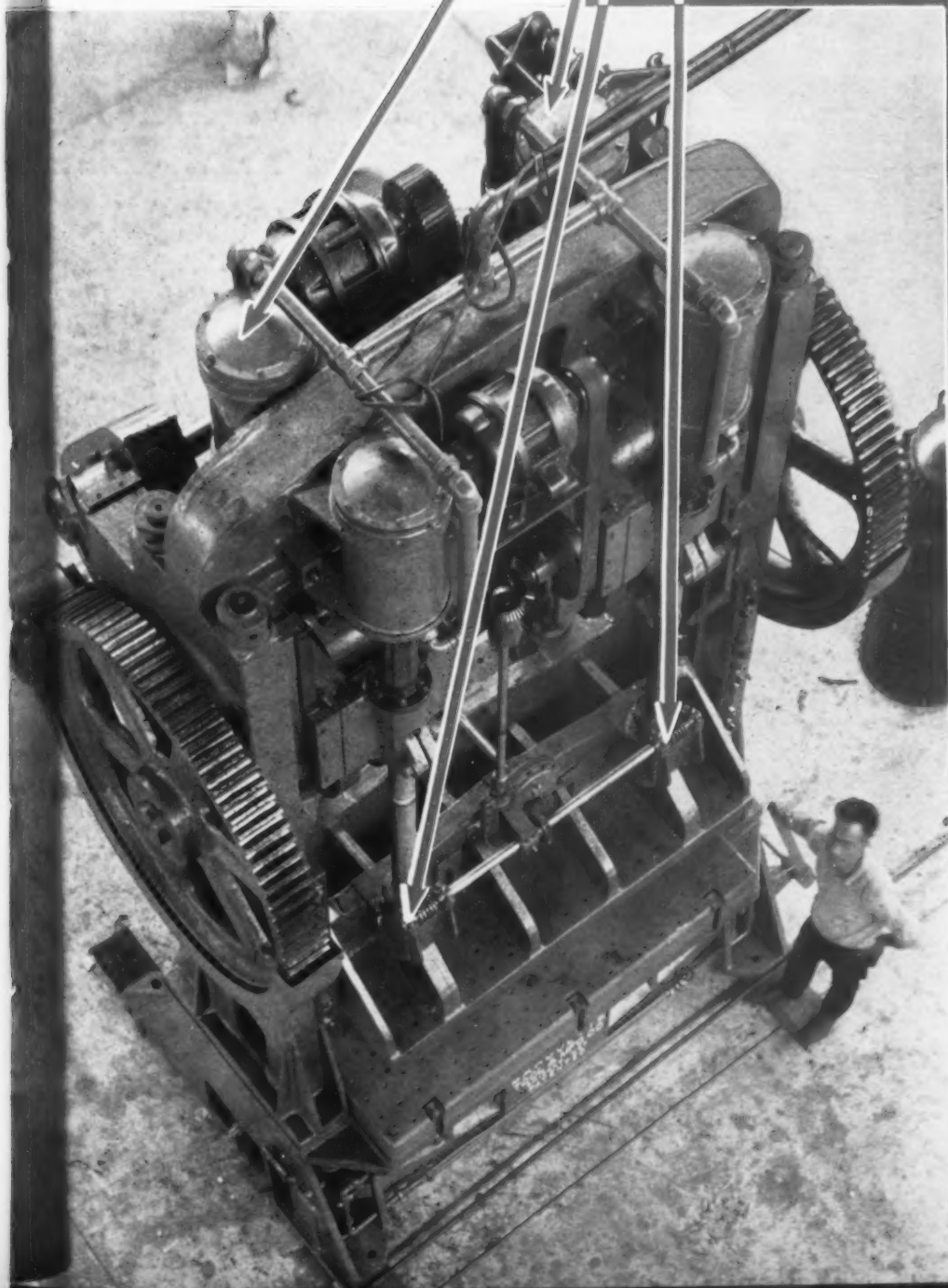
Also can have air cushion blankholder built in, eliminating need for digging foundation pits, simplifying pipe connections.

Making a complete, self-contained unit, easy to move about the shop if desired.

Write for engineering data and information

**MARQUETTE
TOOL & MFG. CO.**

6487 W. 65th Street
CHICAGO, ILL.



*See other side
for Important Announcement*

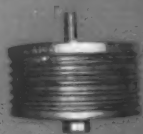
NO MERE IMPROVEMENTS OF MINOR PARTS

Marquette developments are fundamental in their nature, bettering methods of handling work, discarding old forms of machine design.

*Consider the Contributions to Stamping Technique
by this One Firm—*



The Cushioned Press Bed



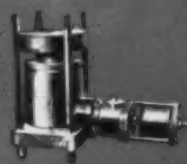
The Air Cushion



Riveting Machine



Die Testing Equipment



Hydro-Pneumatic Die Cushion



Single Cushioned Press Bed

THE AIR CUSHION

—that device which made it possible for the first time to apply a firm, even, easily and accurately regulated pressure to the blank to the full extent of the draw. Rendered springs and rubber bumper blank holders obsolete—largely eliminated spoilage.

CUSHIONED PRESS BED

—makes digging pits for press foundations unnecessary, does away with auxiliary pressure tank, requires but one pipe connection, makes it a simple and inexpensive matter to pick up presses and move them about the shop in accordance with changing requirements of production system. These beds can be built to fit any standard size and type of press, or are easily adapted to presses now in use.

MARQUETTE RIVETING MACHINE

—the outstanding feature of which is that it automatically makes allowances for variations in thickness

*—and now POWER PRESSES with 4 POINT suspension
and air-cushion blank holders built in*

(See other side of this page for description.) This is the first 4 point suspension press ever built. Its basic principle—that of preventing in a mechanically positive manner the tendency of the slide and ram to tip, by suspending the ram from four points—was originated by Marquette engineers.

of parts fed to it, thereby preventing smashed rivets and strains to the press where parts are oversize, preventing loose riveting where parts are undersize. Safe as a hydraulic, fast as a mechanical press.

THE HYDRO-PNEUMATIC CUSHION

—makes it possible to handle tremendously large working pressures in small space, with flexibility to handle small, light work on the same equipment with no time loss for change over, as far as blank holding means is concerned.

THE PNEUMATIC DIE TESTING MACHINE

—which makes it possible to run through the tryouts on dies in a fraction of the time formerly required, and to lift them over to the job press 90% perfect instead of only 50 or 60% needing further adjustment and trial, as has been common practice heretofore. Furthermore, the pressure is accurately determinable in advance.

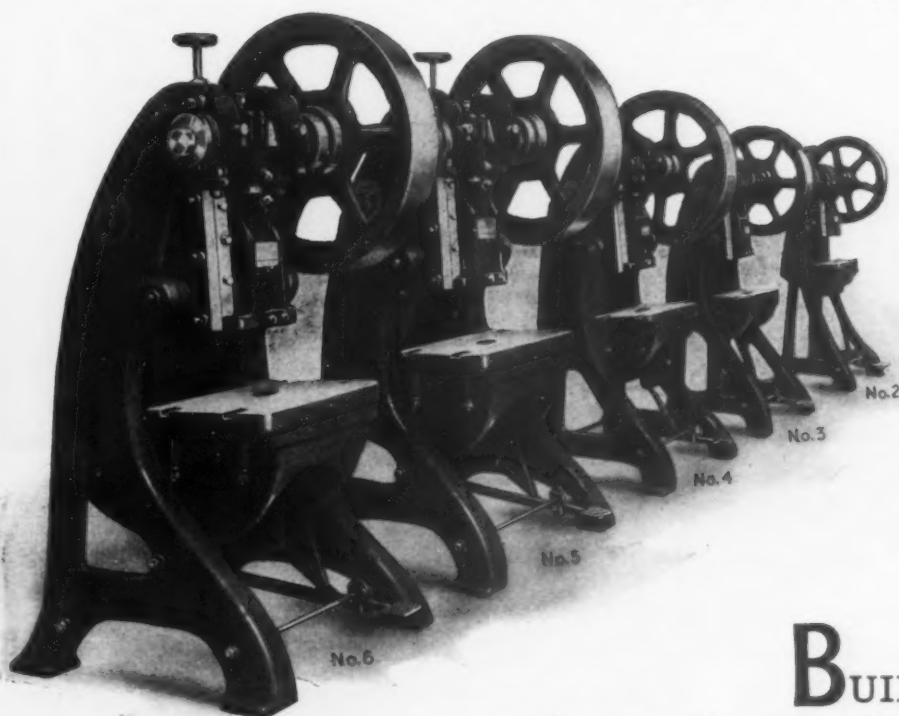
Come to MARQUETTE with your metal stamping and drawing problems.

MARQUETTE TOOL & MFG. CO.

6487 West 65th Street, Chicago, Illinois

"ADRIANCE"

INCLINABLE OPEN BACK POWER PRESSES WITH FRONT ADJUSTMENT



Pacific Coast Representatives:
C. F. BULOTTI MACHINERY CO.
829 Folsom St., San Francisco, Cal.

WESTERN MACHINERY EXCHANGE
Santa Fe Ave. at 9th St.
Los Angeles, Cal.

BUCK & HICKMAN, LTD.
2 Whitechapel Road, London
Sole Agents for Great Britain

We manufacture:

Inclinable Presses
Straight Side Presses
Square Double Seamers
Round Double Seamers
Automatic Feed Presses
Horning and Wiring Presses
Double Action Presses
Double Crank Presses
Drawing Presses
Automatic Screw Rolling
Machines
Punching Presses
Arch Type Presses
Slitters and Shears
Can Making Machinery
Spinning Lathes
Power Squeezers
Crown Cap Making Equipment
Dies and Tools
for Working Sheet Metal

BUILT in five sizes in geared and flywheel types. Their flexibility of operation with dies upon sheet-metal has commended them to the trade as the most practical of all-purpose power presses. "Adriance" Automatic Feeds may be attached to these presses, making complete automatic units for the increased efficiency required in modern mass production.

ADRIANCE MACHINE



WORKS, INCORPORATED

82 RICHARDS STREET

BROOKLYN, N. Y.

☐ Please send copy of Bulletin No. 1, illustrating and describing "Adriance" Inclinable Open Back Power Presses.

☐ Please send information regarding.....

Name

Address

THIS
HIGH SPEED PIPE FITTING TESTING MACHINE
 Will Test 100% of your Production with air under water, guaranteeing

FIRST—Safety.

SECOND—Defective castings scrapped before production starts.

THIRD—No tearing down time in installation costs.

FOURTH—Satisfied customers.

The machine illustrated will test fittings cheaply, easily and quickly. All fittings, 90° and 45° Elbows, Street Elbows, Tees, Crosses and Return Bends in sizes up to 1½" can be tested in one machine at an air pressure of 50 lb. per square inch under water with 90 lb. operating pressure. The fittings can be tested either before or after tapping. Quantities of 500 to 600 can be tested per hour.

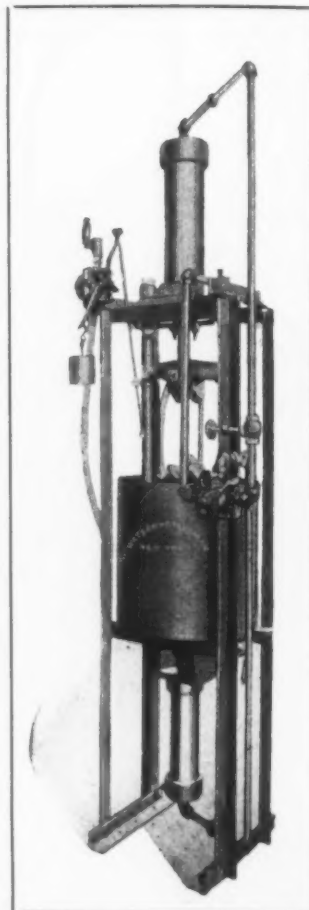
WRITE FOR DETAILS

THE WATSON-STILLMAN CO.
 71 WEST ST., NEW YORK

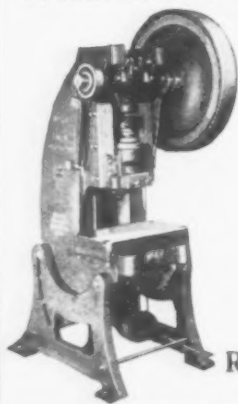
Penton Bldg., Cleveland
 705 Olive St., St. Louis
 Union Trust Bldg., Pittsburgh
 First Natl. Bank Bldg., Cincinnati
 321 Brown Marx Bldg., Birmingham
 228 Central Ave., Los Angeles

228 N. La Salle St., Chicago
 1635 17th St., Denver
 6565 Russell St., Detroit
 58 Fremont St., San Francisco
 Union Nat'l Bank Bldg., Houston
 Widener Bldg., Philadelphia

Forsyth Bldg., Atlanta
 1639 Mutual Bldg., Richmond
 224 Pine St., Portland
 518 4th Ave., Seattle
 Fourth and Wacuta Sts., St. Paul.



THE SPIRIT OF THE TIMES



is reflected in the speed and stamina of "New Rockford" Presses.

They are built to produce and maintain High Production and they do it.

Wide range of sizes and types.

Write today for new catalog.

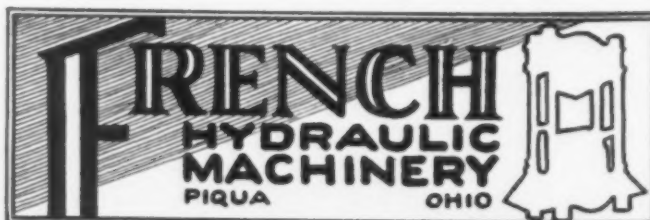
ROCKFORD IRON WORKS
 ROCKFORD, ILL.

RICHARD DUDGEON, Inc.
HYDRAULIC MACHINERY

JACKS, CAR PROPELLERS, PUMPS, PRESSES, PUNCHES
 FILTER PRESS JACKS AND ROLLER TUBE EXPANDERS

ESTABLISHED 1890

BROOME & COLUMBIA STREETS
 NEW YORK CITY



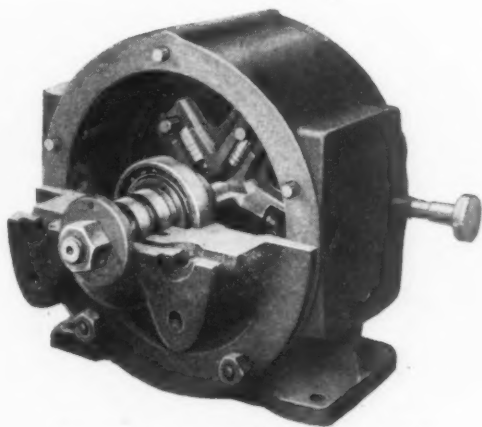
V & O POWER PRESSES
 AUTOMATIC FEEDS
 AUTOMATIC THREADING MACHINES
THE V & O PRESS CO., HUDSON, N. Y.

LAKE ERIE
ENGINEERING CORPORATION
 270 PERRY STREET BUFFALO, N.Y.
 DESIGNERS AND BUILDERS OF
 Hydraulic Presses and Accumulators
 Plate Working Machinery
 Bending Rolls
 Plate Planers
 Punches and Shears
 Rolled Steel Steam Plates
 Valves and Fittings
 Railroad Scale Test Cars
 Special Machinery
 Sugar Machinery

SOUTHWARK
 POWER TOOLS
 TESTING EQUIPMENT
 HYDRAULIC AND SPECIAL MACHINERY
SOUTHWARK FOUNDRY AND MACHINE CO.
 PHILADELPHIA

BIRDSBORO
STEEL FOUNDRY AND MACHINE COMPANY
 BIRDSBORO, PENNSYLVANIA
 Designers and Builders
 Crushing Machinery
 Steel Castings
 Birdsboro 26 Castings
 Hydraulic Presses and Valves
 Rolling Mill Equipment
 Birdsboro 30 Castings
 Special Machinery
 Birdsboro Rolls
 Be sure to note full page ad in this week's "Iron Trade Review"

Hydraulic Smoothness with the HELE-SHAW



Cut away view of High Pressure Hele-Shaw Hydraulic Pump

SURELY, steadily, quietly, with liquid smoothness, Hele-Shaw Hydraulic Pumps go about their work, providing easily controllable power for drives of all kinds.

Without effort, they build up pressure to overcome resistance that would cause gearing to clash and grind, but they do it under such perfect control that no excess pressure ever can be applied to break tools or machines.

The Hele-Shaw Pump operates on a principle of balance. Pressure in the fluid system, automatically controlled, invariably balances the resistance to be overcome up to the limit of the pump's capacity. As a result, operation is continuous, without pulsation, and the Hele-Shaw pump runs at a constant speed, regardless of the pressure or speed at which the machine it drives is operated.

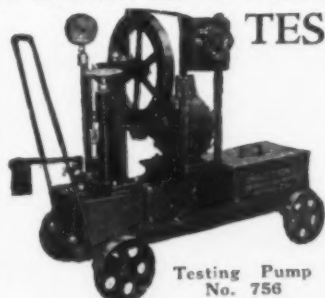
Write for booklet describing the many uses of Hele-Shaw Pumps.

AMERICAN FLUID MOTORS COMPANY

2410 Aramingo Avenue

Philadelphia, Pa.

PORTABLE HIGH PRESSURE TESTING PUMPS



Testing Pump
No. 756

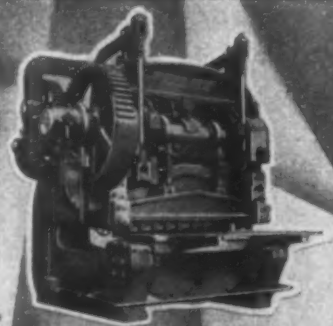
**Hand Belt or
Motor Driven**

Built for the MOST SEVERE SERVICE, with forged steel pressure cylinders, renewable valves and seats and bronze fitted throughout.

CHARLES F. ELMES ENGINEERING WORKS
1003 - 1011 FULTON ST. CHICAGO U. S. A.
ELMES HYDRAULIC MACHINERY

Our Line

Light and heavy machinery for all classes of sheet metal, plate and structural work.



HEAVY GATE SHEAR.
Capacity 6' x 1/4" plate - 36" gap.

BERTSCH & CO.
Cambridge City, Indiana

JOHN ROBERTSON CO
HYDRAULIC PRESSES and PUMPS

Extrusion Presses Platen Presses Hydraulic Pressure Pumps
Lead Encasing Presses Moulding Presses and Special Machinery
See our advertisement in the second issue, each month.

123 WATER ST. BROOKLYN, N.Y.

MILWAUKEE ALLIGATOR SHEARS

Milwaukee ALL STEEL Shears will *outcut* and *outlast* any other alligator shear. They are made by BUILDERS OF ALLIGATOR SHEARS ONLY—FOR 30 YEARS.

DOELGER & KIRSTEN
3105 Chambers Street, Milwaukee, Wis.



SHEARS-PUNCHES
HEAVY PRESSES
UNBREAKABLE
STEEL PLATE
FRAMES

PELS

HENRY PELS
& CO., Inc.
90 West St., New York

R.S. NEWBOLD & SON COMPANY

Straighteners & Levellers Shears
Mill Tables Pipe & Tube Bending & Cutting Machinery
Washer Punches Contract & Special Machine Work
Tanks Stacks Fabricated Plate Work

53 PARK PLACE 140 WASHINGTON ST. 400 UNION TRUST BLDG.
NEW YORK CITY NORRISTOWN PITTSBURGH, PA.
PENNSYLVANIA

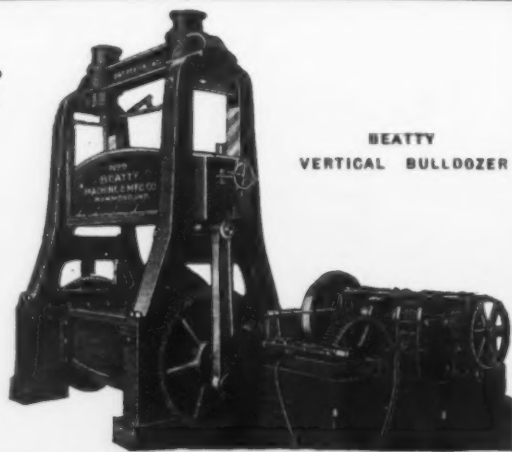
The Beatty Vertical Bulldozer

This Beatty Machine gives the greatest possible clear working space, with ample die-room for two or more set-ups. All parts are well proportioned to give strength and rigidity. The ram is counterbalanced, and the double friction clutch gives an immediate stop and reversal at any point.

Write for our new literature covering complete line of Vertical Bulldozers.

BEATTY MACHINE & MFG. CO.

150th and Oak Street
HAMMOND, IND.



BEATTY
VERTICAL BULLDOZER

QUICKWORK



ROTARY SHEARS

—cut square and beveled edges in straight or irregular shapes, cut and flange circles, jogle, etc. One "QUICKWORK" replaces several old standard machines and does work they will not do. Made in many sizes for all gauges up to 1".

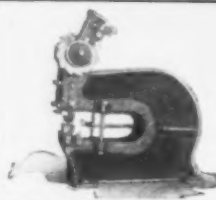
Write for Catalog No. 90

THE QUICKWORK COMPANY

(NOT INCORPORATED—H. COLLIER SMITH, OWNER)

ST. MARY'S, OHIO, U. S. A.

Cable Address: "QUICKWORK." All standard codes used.



BELOIT LEVER PUNCH

Designed for the heaviest work. Quickly changed to work with or without ratchet. 4" to 15" throat. Will punch $\frac{1}{2}$ " hole through $\frac{3}{4}$ " iron or equivalent. Get our complete catalog.

HENDLEY and WHITEMORE CO.
Blackhawk Blvd., Beloit, Wisconsin

KANE & ROACH



STRAIGHTENING ROLLS
BENDING ROLLS
COLD ROLL FORMING MACHINERY
SPECIAL MACHINERY



Syracuse, N. Y.

.. SMITH ..

Unbreakable Steel
Plate Frame

Punching
and Shearing
Machines

... cut costs,
boost profits

Bending Machines
for rolling
Angles, Beams,
Channels, etc.

... famous for
accurate work

David H. Smith & Sons, Inc.

Representatives in All Principal Cities of U. S. A. and Canada
Foot of 51st St. Brooklyn, N. Y.

HAND BRAKES

POWER BRAKES

PRESS BRAKES

POWER SQUARING SHEARS

COMPLETE LINE OF SHEET AND PLATE
BENDING AND SHEARING MACHINES FOR
LIGHT SHEETS OR PLATES UP TO $\frac{1}{4}$ " THICK.

OVER 30,000 USERS

WRITE FOR LITERATURE

DREIS & KRUMP MFG. CO.

7430 LOOMIS ST., CHICAGO

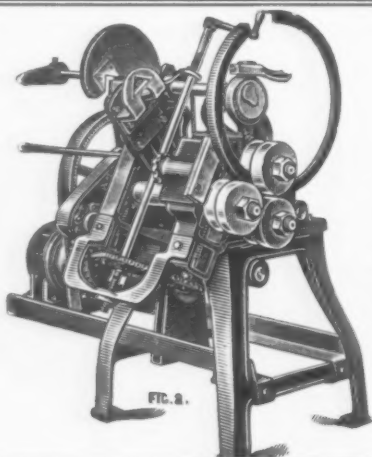


FIG. 2.

CIRCULAR ANGLE BENDING MACHINE No. 14

Capacity up to 2 in. Angle Iron 10 in. to 10 ft. circles
With or without cut-off attachment; belt or motor driven.

True circles can be formed on this Machine free from twist.
We are designing a Machine to bend into circles, U or S shape, 4" x 4" angle iron or under.

Your inquiries solicited.

Also manufacturers of Automatic Grinding and Polishing Machines, Crushers, Pulverizers, Power Shears, Presses, Punches, Brakes, etc.

Write for Descriptive Circulars

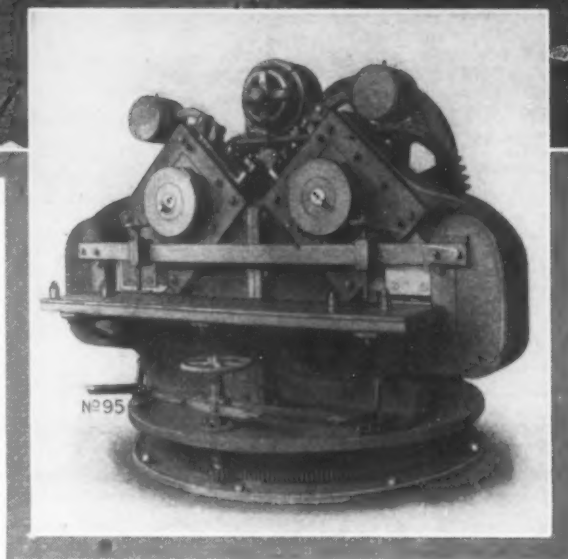
EXCELSIOR TOOL & MACHINE CO.
EAST ST. LOUIS, ILL.

"CAPTAINS IN THE PARADE OF PROGRESS"



JOHAN A. ROEBLING, the master builder of bridges, believed in an ideal; fought for an ideal and died when that ideal was partially realized. After the successful completion of his Niagara Bridge Roebling pressed his plans to span the East River with a suspension bridge. His battle with the skeptics, the unbelievers and the politicians for approval of his plans is an epic in itself. But at last he received the coveted contract and the Herculean construction task was commenced. He was without engineering precedent; his men had to be personally trained and his machinery for the spinning of the cables and the fabrication of the steel was woefully primitive. His health broke under the great strain and he died. But the groundwork had been laid and his son was able to carry the work to a successful end in 1883.

The Brooklyn Bridge was over ten years in the making. Today a modern bridge of the same or even greater size is built in less than half the time. Great progress has been made, not alone in construction methods, but also in machinery for the fabrication of the steel. Today fabricators using Thomas Machinery are establishing records in structural steel construction that not even Roebling, advanced thinker though he was, would have dared to predict.



THE Thomas Angle Shear may be depended upon to give accurate, economical production on any angle cutting job. It is designed for square or mitre shearing of any angle up to 45 degrees. Details of construction and performance are available in Bulletin number A113. Write for it.

THOMAS

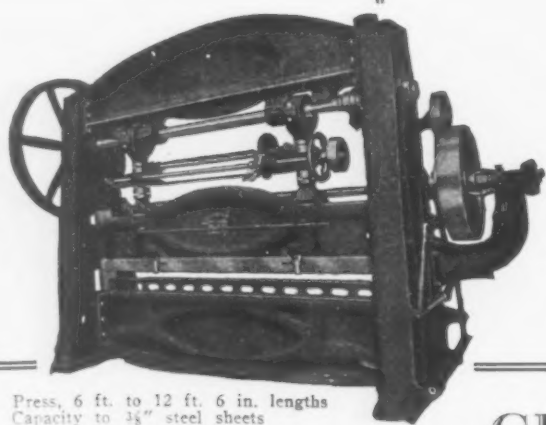
SPACING MACHINE COMPANY

CHICAGO

PITTSBURGH

PHILADELPHIA

HERE'S *What you can do on this* **OHL-10 Ft. Power Brake**



Press, 6 ft. to 12 ft. 6 in. lengths
Capacity to 3/8" steel sheets

—Bend a ten-foot sheet of No. 10 gauge steel—or, form skylight bars of No. 26 gauge steel in two operations. The seven members are bent in one operation and the bar squeezed together in the next.

This OHL Power Brake is equipped with a new method of holding dies, is amply proportioned, and heavily constructed, and includes a patented friction gear.

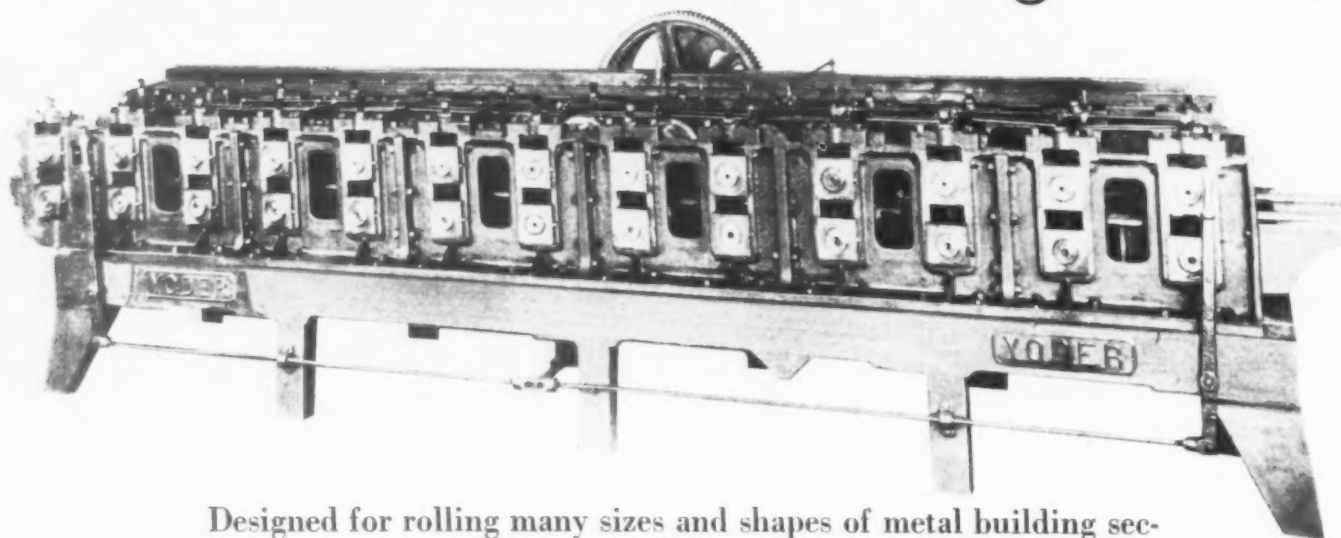
We'll be glad to go over this machine with you point for point and explain how economical—and simple—it is to operate.

GEORGE A. OHL & CO., Inc.
Originators of Sheet Metal Working Machinery Since 1863
151-161 Oraton St. Newark, N. J.

*Crimping and Hammering
Machines—Slitting
Shears—Power Presses.*

*Double Cam Brakes—Slip
Roll Formers—Squaring
Shears—Mitre Cutters—*

Yoder H 1335 Cold Roll Forming Machine

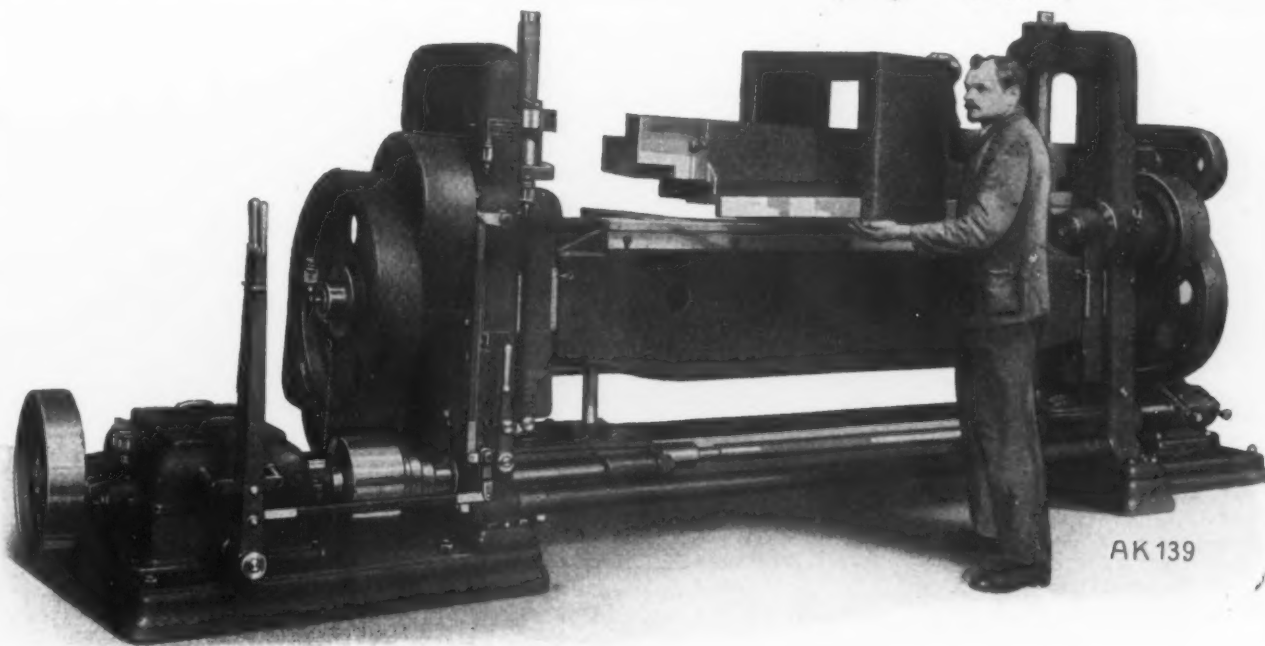


Designed for rolling many sizes and shapes of metal building sections; metal trim, moldings, roofing sheets, flooring plates, casings, heavy tubing, and similar sections at 80' to 100' per minute.

Send drawings for estimate

THE YODER COMPANY, CLEVELAND, OHIO

55TH STREET AND WALWORTH AVE.



**Schatz Universal Brake Folding, Rounding and Box-Forming Machine with
Swing-out Top Bar**

The Most Unique Plate Bending Machine Available

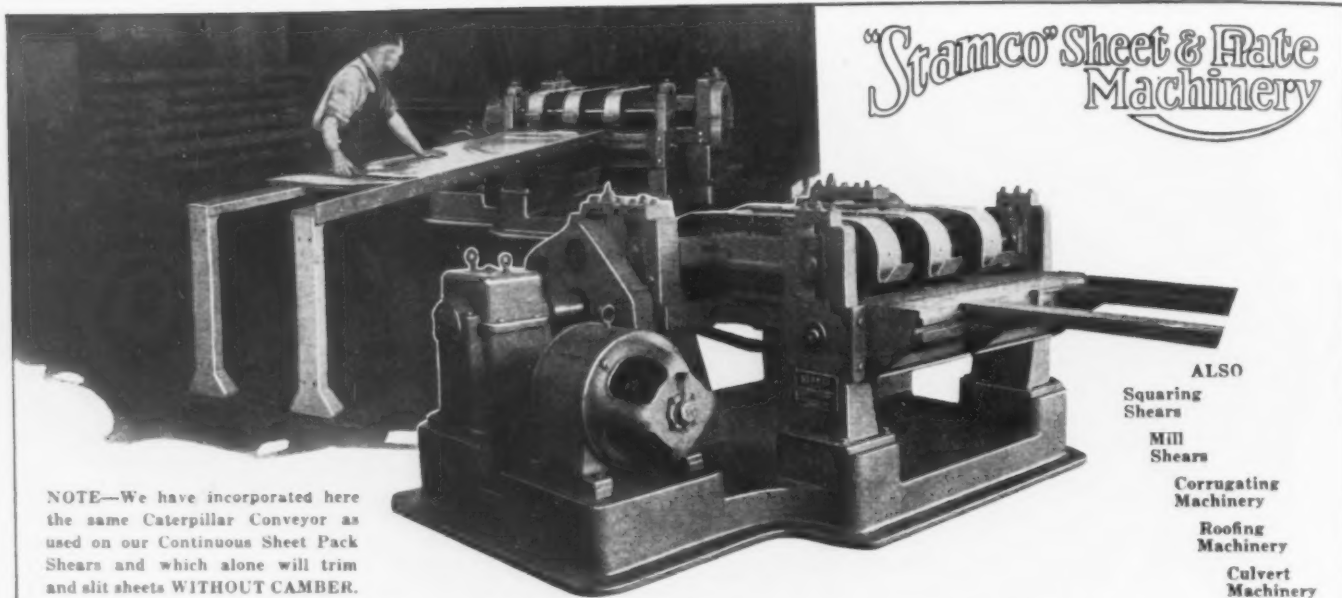
Made in various widths for various plate thicknesses, and for hand or power operation

For instance: a 10' x $\frac{3}{8}$ " machine has some of the following characteristics—

- An Upward Adjustment of the Top Clamping Bar of 18 $\frac{3}{4}$ "
- A Downward Adjustment of the Bottom Clamping Bar of 8"
- An Outward Adjustment of the Folding Bar of 8"
- Bends any Radius up to 8" in one sweep of the Folding Bar
- Forms Tubes, Straight or Tapered, up to 16" Diameter
- Makes Boxes or Tanks from One Sheet of Material over the Top Clamping Bar, which has a cross section of 14" x 15 $\frac{1}{4}$ "
- Such Boxes can have inside or outside flanges at either or both ends.
- Can make Smaller Rectangular Forms over special bar inserted between Top and Bottom Clamping Bars
- Can use High Angle Forming Blade for bending Trays, etc., with Walls up to 15" High.
- Bends are made Accurately, in a Straight Line, up to Maximum Capacity and during the long life of the Machine
- No Loosening of Screws to change Blades in Top Clamping Bar

Ask for Illustrated Form 129

THE SCHATZ MANUFACTURING CO.
POUGHKEEPSIE, N.Y.
"UNUSUAL MACHINE TOOLS"



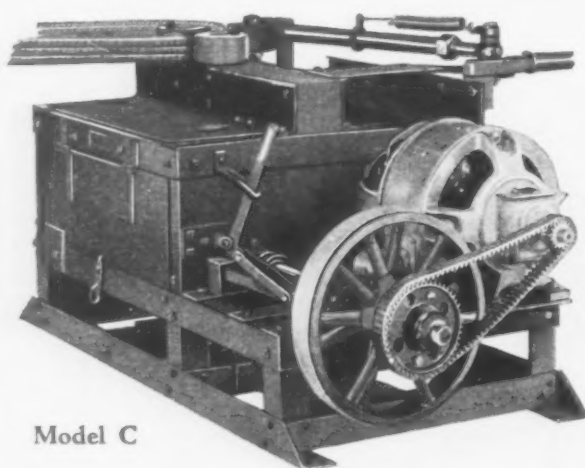
"Stamco" Sheet & Plate Machinery

NOTE—We have incorporated here the same Caterpillar Conveyor as used on our Continuous Sheet Pack Shears and which alone will trim and slit sheets WITHOUT CAMBER.

ALSO
Squaring Shears
Mill Shears
Corrugating Machinery
Roofing Machinery
Culvert Machinery

Caterpillar Holddown Conveyor Rotary Slitter
(Patent Applied For)
Especially designed for trimming and slitting long sheets, etc.

The STREINE TOOL & MFG. CO.
NEW BREMEN, OHIO



Model C

THE KARDONG CIRCLE (Silent Chain Drive) BENDER

Circles of any size required in reinforcing work from 18" in diameter up can be made on this bender. Changes of radius can be made in the same circle, without stopping machine with lever adjustment. Where speed and large capacity are required this machine will give unfailing satisfaction. It is the right machine for the fabricator having a heavy tonnage of reinforcing circles. As high as five one-half inch Bars can be bent in one operation.

Ask for catalogue of our complete line of reinforcing steel benders.

KARDONG BROTHERS, Inc.
MINNEAPOLIS, MINN.



1 of 21

Sizes and Types of Hand and Motor Operated Cold Pipe Bending Machines we make bending $\frac{1}{4}$ " to 8" Pipe.

Cost of Bending	1"—3 cents	3"—20 cents	8"—80 cents
	2"—5 cents	4"—40 cents	8"—\$1.00

Over 8,000 in use. Send for catalog. Pipe Threading and Cutting Machines $\frac{1}{4}$ " to 16".

AMERICAN PIPE BENDING MACHINE CO., Inc.

31 Pearl Street, Boston, Mass.

ALLEN RIVETERS

VARIOUS TYPES AND SIZES
FOR ALL RIVETING PURPOSES

JOHN F. ALLEN CO.

372 GERARD AVENUE NEW YORK

HANNA RIVETERS

HANNA ENGINEERING WORKS

1761 ELSTON AVE., CHICAGO, ILL.

BIRMINGHAM, ALA.
NEW YORK

LOS ANGELES
RICHMOND, VA.

CLEVELAND OHIO
SAN FRANCISCO

DETROIT
ST. LOUIS

SWIFT

ELECTRIC WELDER Co.

Manufacturers of BUTT AND SPOT WELDING MACHINES, HAND AND AUTOMATIC

Office: Boulevard Temple Bldg., W. Grand Blvd. at 13th St., Detroit, Mich.

Factory: 817 S. Leighton St., Kenton, Ohio.



Now is the time

*for improvements—
reclamation—
repair—*

This is the time, in advance of heavier schedules, to make those improvements in your plant layout, equipment or machinery that your last rush season showed to be desirable.



Also, it would be worth while to inspect that scrap pile and see if there is not a good deal of material that can be economically reclaimed by welding. Many parts that seemed doomed to the "buster" may be profitably put back into service by welding cracks and breaks or building up worn spots or surfaces.

Let us help you to the many economies in your plant that are possible with Airco - Davis - Bournonville welding and cutting equipment, Airco Oxygen and Acetylene.

Airco Offices:

Baltimore	Milwaukee
Bettendorf, Ia.	Minneapolis
Birmingham	New Orleans
Boston	Oklahoma City
Buffalo	Philadelphia
Charlotte	Pittsburgh
Chicago	Portland, Ore.
Cincinnati	Richmond
Cleveland	San Francisco
Dayton	Seattle
Detroit	Shreveport, La.
Jersey City	St. Louis
Los Angeles	Wheeling
Louisville	Wichita

AIR REDUCTION SALES COMPANY

Lincoln Bldg., East 42nd Street

NEW YORK CITY

Airco Oxygen—Airco Acetylene—Airco-National Carbide—Airco-Davis-Bournonville Welding and Cutting Apparatus—Supplies

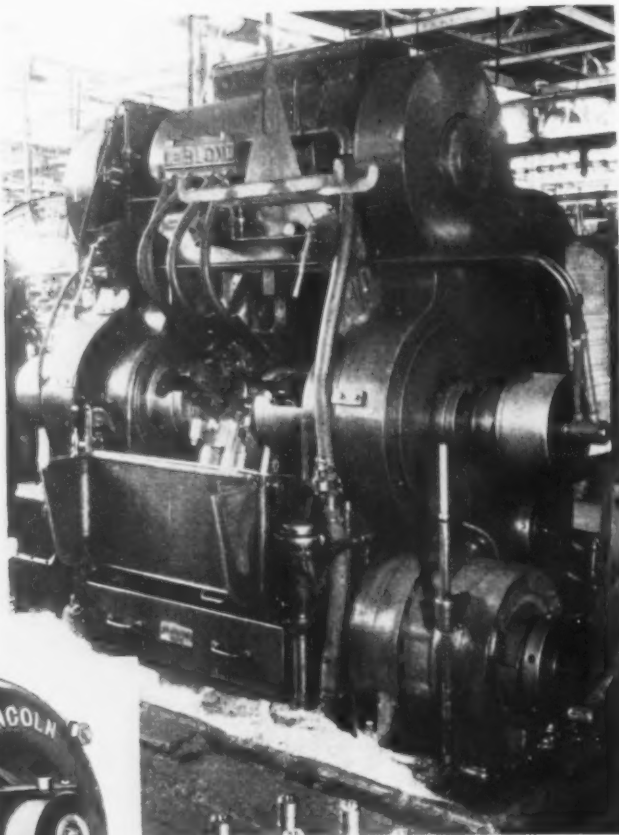
90 Plants

125 Distributing Stations

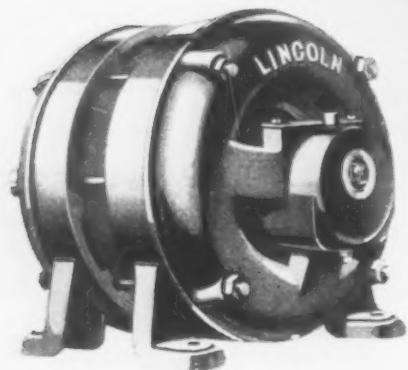
Exhibiting at the Petroleum Exposition, Tulsa, October 4 to 11, Spaces 32, 33 and 34, Oklahoma Building



TRADITION



PROGRESS



● Le Blond lathe powered by Lincoln "Linc-Weld" motor, in plant of large motor car manufacturer. ●

"YOU'LL be glad to know that the order has finally been placed for the big new machines. It has taken a long time to decide which make was best for our purpose but now all that remains is the simple matter of ordering some motors to drive them and we'll be all set."

"That's one way of looking at it . . . care on machine selection and *don't* care on motor choice.

That's the way one motor car builder looked at it until motor shutdowns called his attention to some things.

They tried out a 'Linc-Weld' motor on a Le Blond lathe for turning crank shafts.

Since then there has been no forced shutdowns on this lathe. For more than a year the 'Linc-Weld' motor has been stopped and started 17 times every working hour . . . and HOW.

When they stop the motor, they STOP it . . . for as soon as the turning operation is completed, the motor is automatically thrown into the reverse direction to stop it.

Did I hear you say 'Magical results'? Not at all. 'Linc-Weld' is built for that service. No magic to it . . . just superior design (on three counts) and superior construction of STEEL."

THE LINCOLN ELECTRIC COMPANY
DEPARTMENT NO.19-10, ♦ CLEVELAND, OHIO

M-77

LINCOLN

"LINC-WELD" MOTORS

Federal

Announcing to the Metal Industry

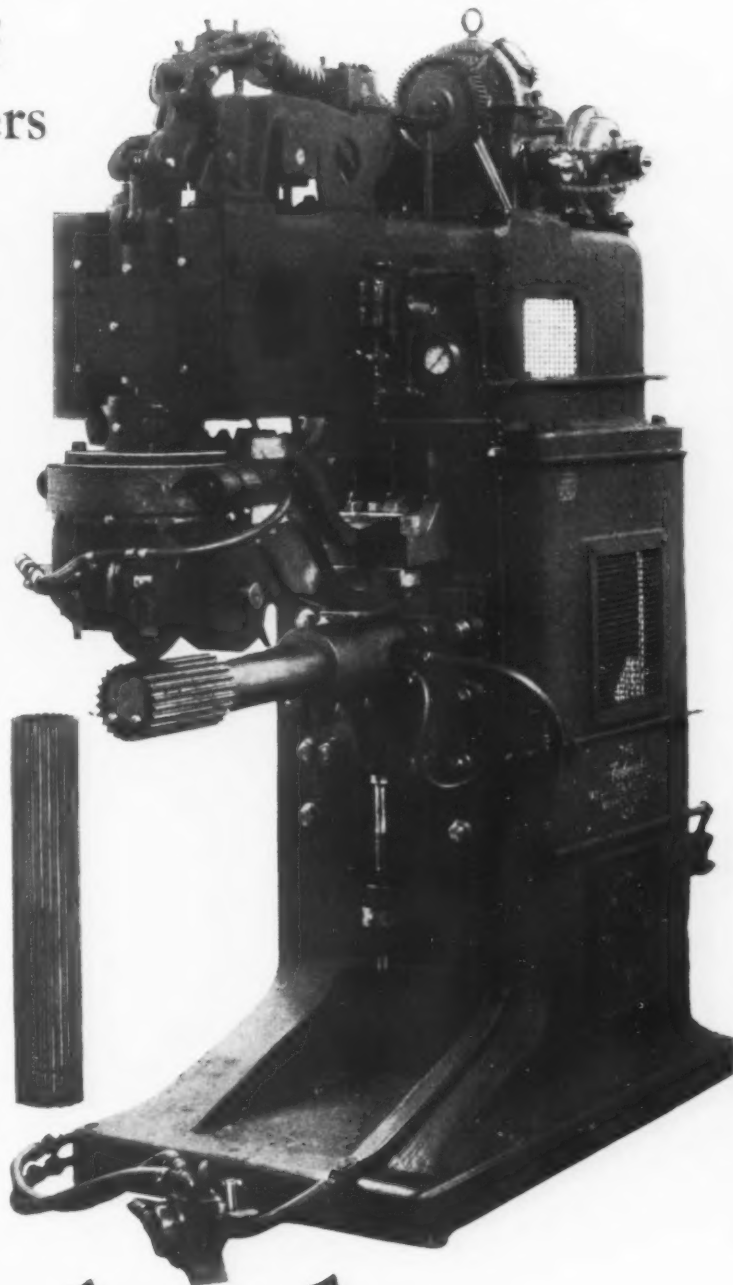
A Standard Line of Federal Seam Welders

All the experience, the knowledge of Seam Welding requirements, that have gone into the construction of Federal Seam Welders designed for special work, have now been concentrated in the production of the new Federal Line of Standard Model Seam Welders of which this machine is an example.

Unique features such as — pressure supplied by air through a toggle device with easily adjustable and readily accessible spring control; all current carrying parts water cooled; no magnetic material used in or near the welding rolls; either or both rolls can be driven according to the requirements of the work.

The capacity range of this new Federal Line is from 50 to 150 K.W. with 16 points regulation through a separate regulating coil; speeds 10 to 30 feet per minute on 16 to 24 gauge; throat depths from 24" to 48". The machine shown welds inside a 6" corrugated tube.

Send for details of this New Line of Federal Standard Model Seam Welders.



THE
Federal

MACHINE & WELDER COMPANY

Factory and Home Offices: Warren, Ohio

SALES OFFICES:

Buffalo—1116 Genesee Bldg.
Chicago—15 S. Clinton St.
Cincinnati—303 Hazen Bldg.
Cleveland—1053 Leader Bldg.

Detroit—914 Fisher Bldg.
Los Angeles—Smith Booth Usher Co.
New York City—50 Church St.
Philadelphia—Bourse Bldg.

Pittsburgh—Rush Machinery Co.
San Francisco—Jenison Machinery Co.
St. Louis—304 Security Bldg.
Minneapolis—F. E. Satterlee Co.

THOMSON-GIBB WELDERS



SPOT — BUTT — SEAM
PROJECTION — FLASH
AND SPECIAL TYPES

We maintain a staff of experienced sales engineers and service men in all important industrial districts.

THOMSON-GIBB ELECTRIC WELDING CO.
LYNN, MASS. BAY CITY, MICH.

TAYLOR-WINFIELD SPOT-BUTT-SEAM
PORTABLE WELDERS
For labor-saving lower-cost production
The TAYLOR-WINFIELD CORP., WARREN, O.

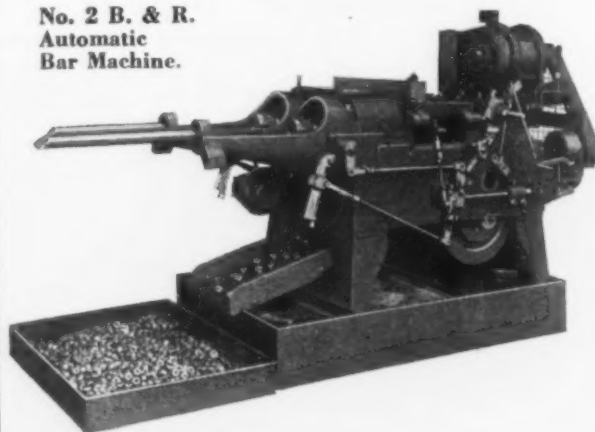
AGNEW WELDERS

ELECTRIC SPOT, BUTT & SEAM WELDERS
STANDARD & SPECIAL
WIRE WELDERS A SPECIALTY

AGNEW ELECTRIC WELDER CO.

Manufacturers of Electric Welding Machines since 1905
MILFORD, MICH.

No. 2 B. & R.
Automatic
Bar Machine.



Profit-Earning Nut-Blank Equipment.

Proven Advantages of B. & R. Automatic Bar Machines
for Making Nuts

More Nuts from given weight of stock
used.

Higher Grade of Product.

More Production per spindle per hour.

Repeat orders verify these claims.

These machines are built in four sizes, covering range of
nut sizes from $\frac{1}{4}$ " to 2" U. S. Std. Will handle either cold-
drawn or hot-rolled bar stock.

**THE BUDD-RANNEY
ENGINEERING CO.**

119 WEST CHESTNUT ST., COLUMBUS, OHIO, U. S. A.

MANVILLE

DESIGNERS and BUILDERS
SINCE 1886

Bolt—Nut—Rivet—Carriage & Machine Bolt—
Cap Screw Machines, Wood Screw Machinery,
Hot and Cold Ball Machines, Power Presses,
Wire Formers

THE E. J. MANVILLE MACHINE CO.

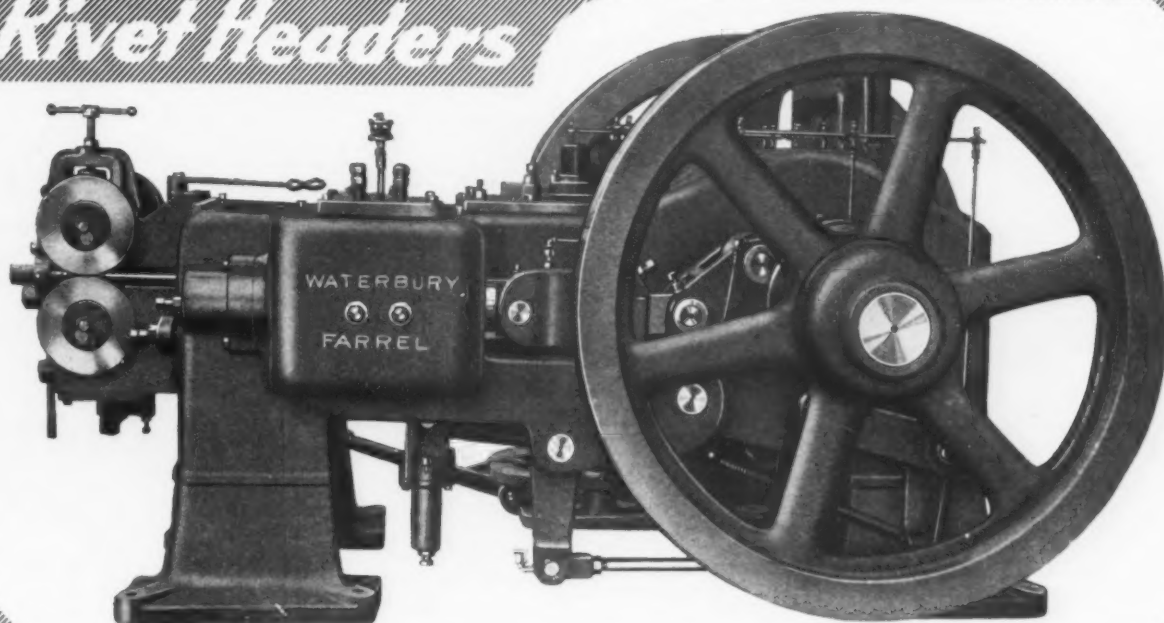
Home Office and Works—Waterbury, Conn., U. S. A.

Branch Offices

1209 Sweetland Bldg.
Cleveland, Ohio

Stephenson Bldg.
Detroit, Mich.

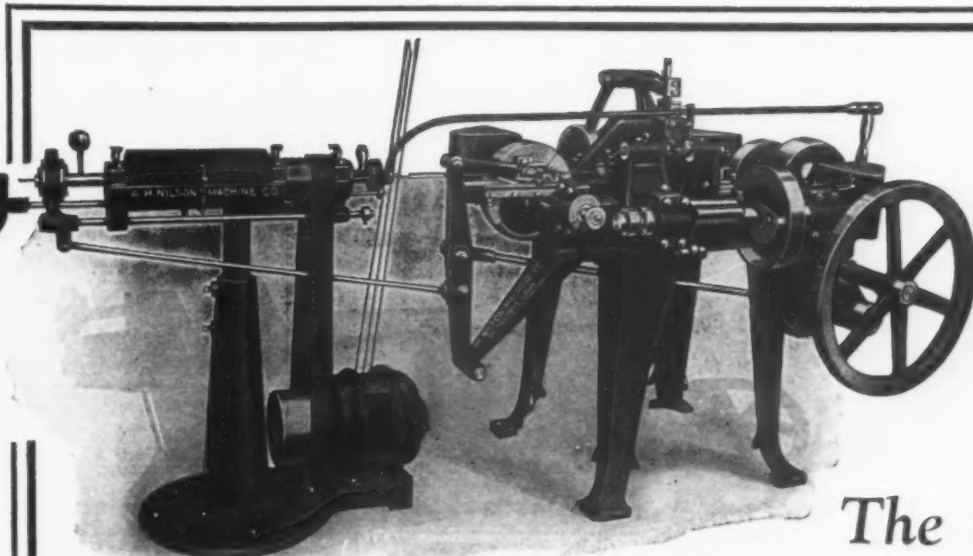
WATERBURY-FARREL BOLT, SCREW, RIVET AND NUT MACHINERY

Rivet Headers

Open Die Single Stroke machines, sizes for $\frac{1}{8}$ " to $\frac{7}{8}$ " rivets. The illustration shows the $\frac{3}{4}$ " size for rivets $2\frac{1}{2}$ " to 6" long under the head. Production, 80 to 95 per minute depending on the length. Floor space, 94" x 138"; weight 41,000 pounds.

The Waterbury Farrel Foundry and Machine Company

HOME OFFICE AND WORKS: Bank and Meadow Sts., Waterbury, Connecticut
WESTERN SALES OFFICE: 736 Bulkley Building, Cleveland, Ohio



The **NILSON** FOUR SLIDE WIRE FORMING MACHINE

Wire forming machines are generally equipped with the well known, two-way Roll Straightener, but when a more effective straightener is required, or spring wire is to be formed, a Rotary Straightener is the solution.

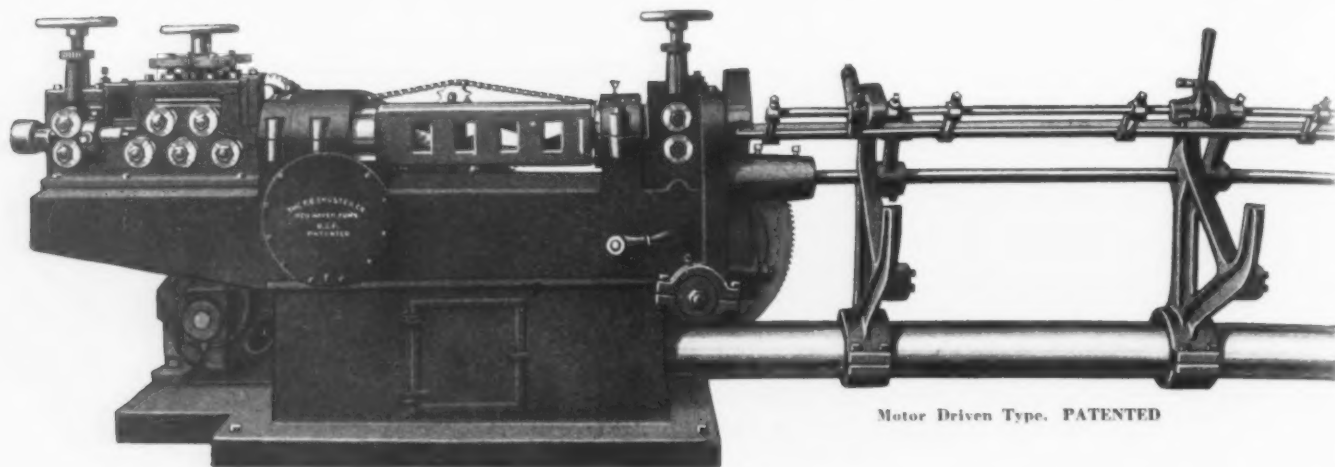
The usual objection to the ordinary overhead countershaft driven straightener is that it cannot be started or stopped simultaneously with the forming machine itself.

Another objectionable feature has been eliminated by replacing the unreliable spring controlling the oscillation of the arbor with a positive rod connection to the feed arm of the forming machine.

The maximum capacity of the straightener described herein is No. 7 gauge—minimum No. 12 gauge. By furnishing an extra arbor, all sizes to No. 18 gauge can be straightened on the machine.

The straightener may be ordered with either or both arbors.

THE A. H. NILSON MACHINE COMPANY - - Bridgeport, Conn.



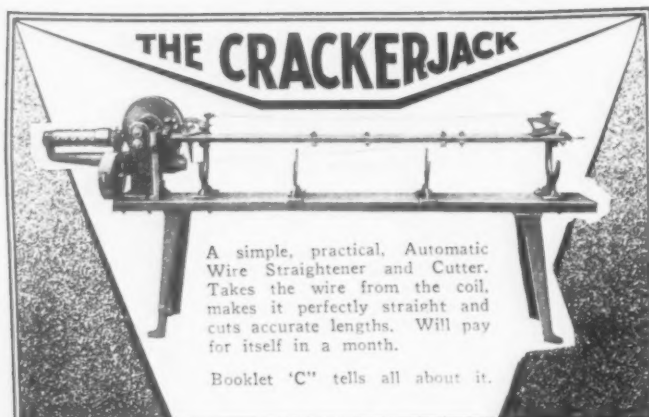
Motor Driven Type. PATENTED

Wire Straightening Your Problem?

Our experience covers 64 years studying the requirements of the trade, and the best way to meet them, and we can give you valuable assistance in cutting down your production costs. . . . Sturdy Machines which stand up to their work permanently, and pay for themselves in a short time. Timken Bearings, Texrope to motor, etc. Up-to-the-minute Machines in every respect. High production Machines. . . . Made in many sizes, and for ALL KINDS of wire.

THE F. B. SHUSTER CO., New Haven, Conn.
Straightener Specialists Since 1866

....Consult SHUSTER



THE CRACKERJACK

A simple, practical, Automatic Wire Straightener and Cutter. Takes the wire from the coil, makes it perfectly straight and cuts accurate lengths. Will pay for itself in a month.

Booklet 'C' tells all about it.

THE FRANKLIN MFG. CO. New Haven, Conn.

WIRE MACHINERY

Equipment
for

SPRING MAKING
SPECIAL COILING
CABLE ARMORING
LOCK WASHERS
NAILS & STAPLES
WIRE DRAWING
WIRE ROLLING

SLEEPER & HARTLEY, Inc.
WORCESTER, MASS.

COOK CAP SCREW MACHINES

for shaving CAP SCREWS under and over the head in one operation.

COOK WOOD SCREW MACHINES

For making IRON AND BRASS WOOD SCREWS.

THE ASA S. COOK CO., HARTFORD, CONN.

WIRE STRAIGHTENING AND CUTTING MACHINES

Timken Roller Bearings—Texrope Motor Drive
Sizes up to 1/2"—Built for Hard Service

THE LEWIS MACHINE CO.

1600 E. 24th STREET, CLEVELAND, OHIO



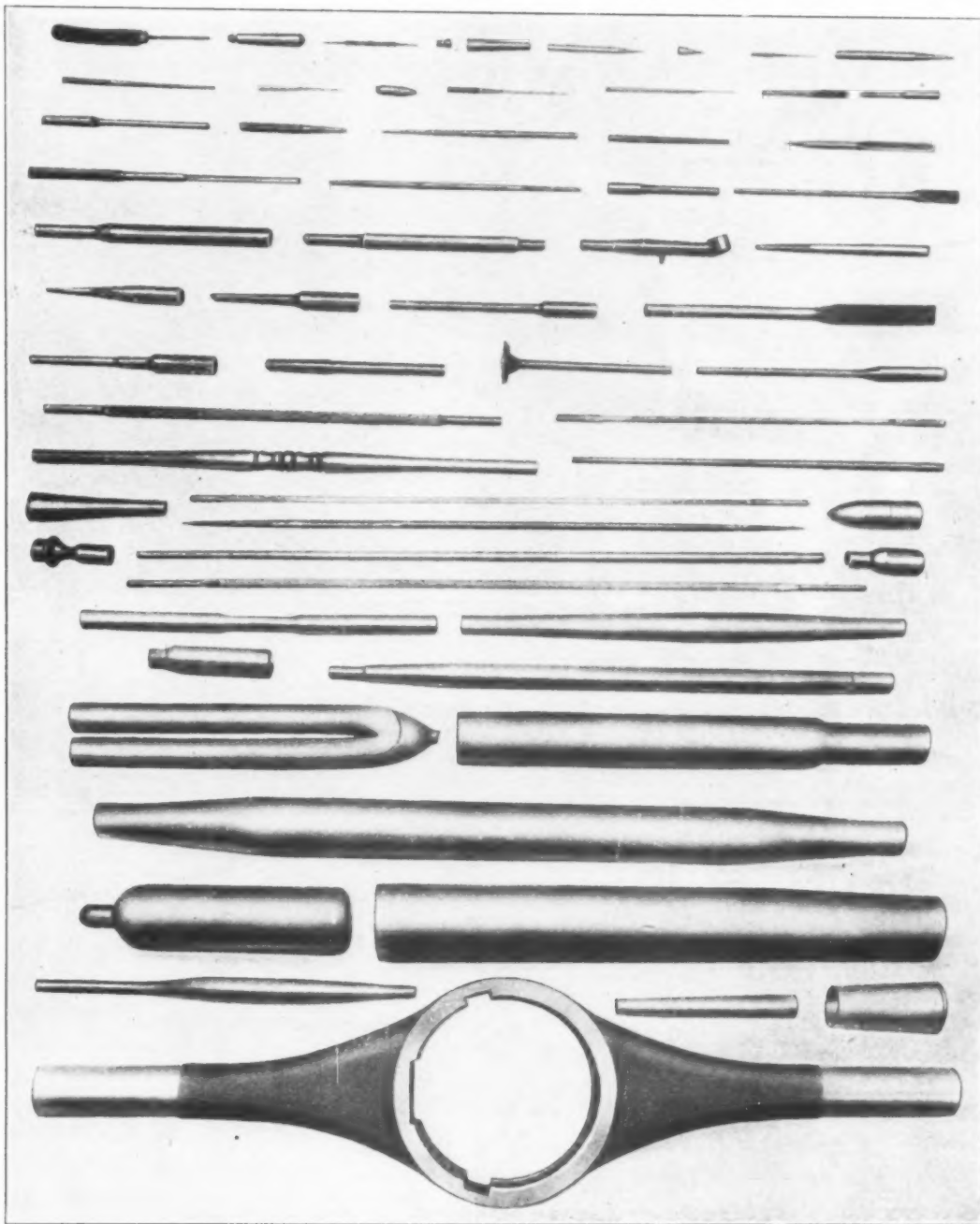
THE DAYTON

TORRINGTON
SWAGING MACHINE

—with 4000 forceful squeezing hammer blows per minute—makes metal tougher and more elastic. Send for booklet—"The Modern Art of Swaging."

The Torrington Co., Excelsior Plant
55 Field Street Torrington, Conn.

50 Years Building Swaging Machines



Samples of work swaged on Langelier Machines for most economically reducing, refining and saving metal

WE manufacture 25 types of Swagers with capacities from pin pointing to 5" diameter stock, our machines swaging such parts as Caliper legs, auto housings, tubular propeller shafts, drive shafts, stub shafts, gear shift levers, valve stems, motorcycle forks, steering knuckles, steering drag links, brake yokes, cutlery, textile spindles, tungsten filament wire, boiler tubes, superheater units, screwdrivers, tapper tap shanks, ice and nut picks, dental instruments,

button hooks, oil can spouts, tapered axle ends, tie rods, wire spokes, temple butts for eye-glass frames, bicycle handle bars, nail sets, center punches, drift pins, knife tangs, wrench handles, ignition and carburetor control levers, machinists' tools, steering housing tubes, twist drills, wire pointing, baby carriage parts, jewelry, telephone parts, optical parts, tubing and miscellaneous forgings.

Write for Circular "I-A."

THERE'S NO SUBSTITUTE FOR 50 YEARS' EXPERIENCE

LANGELIER MANUFACTURING CO., Providence, R. I.

Designers and Builders of Hot and Cold Swaging Machines, Hammering Machines, Sensitive Drills, Multiple Spindle Drilling and Tapping Machines, Multiple Spindle Attachable Drill Heads, Automatic Drilling and Tapping Units, Foot, Power, Screw Presses.

Time Saved Means Reduced Overhead

In 1929 one Etna Swaging machine was installed by the

**Hoskins Mfg. Co.
of Detroit**

Four additional machines are now in operation in this plant because the management says they are good time savers.

One swager cares for 2-6 head blocks drawing Nickel-chromium wire to 14 to 16 gauge by 3 in. long.

YOUR production problems can be met by

**The
Etna Machine Co.
Toledo, O.**



No. 2A

"STANDARD" SWAGERS

—the machines for higher efficiency and production on all swaging operations.

Rigid Construction, Long Bronze Bearings, Oil Reservoir. Adaptable to motor drive.

Capacities from 0" to 4 3/4".

STANDARD MACHINERY CO.
Auburn, Rhode Island

**A COMPLETE LINE
OF PORTABLE
CONVEYORS**
A MACHINE FOR EVERY
HANDLING SERVICE
WRITE FOR
CATALOG

PORTABLE MACHINERY CO. CLIFTON, N.J.

ELEVATORS

Steam
Hydraulic

The Ridgway Steam Hydraulic Elevator is PERFECTION for the man who has steam or air available.

Hundreds in use in Biggest Plants

"HOOK 'ER TO THE BILER!"

CRAIG RIDGWAY & SON CO., COATESVILLE, PA.



Owen Buckets

Stronger and Built to Last Longer, Owen Buckets get "A Mouthful at Every Bite" and More Bites Per Day.

OWEN BUCKET CO.
6013 BREAKWATER AVE. CLEVELAND, OHIO



MILWAUKEE CRANES and HOISTS



Standard and special overhead traveling cranes and hoists. Single line Grab Buckets. Write for bulletins.

**MILWAUKEE ELECTRIC CRANE AND
HOIST CORPORATION**
Milwaukee Wisconsin

Representatives in principal cities.

See these versatile buckets on the job

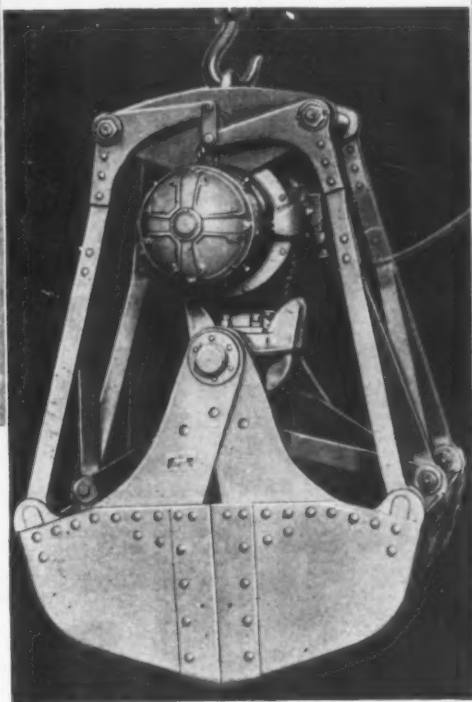
Now, by means of these movies, you may see Hayward Electric Motor Clam Shell Buckets actually at work on the jobs that interest you. Tell us when you will be in New York, and we'll gladly arrange to give you a private showing. Or, if you prefer, we will send the reels to you.

These movies show at a glance the versatile performance Haywards give on every job they tackle. Reel after reel reveals a Hayward's power. Every film is a convincing record of Hayward ability to play a leading part in the reduction of material handling costs.

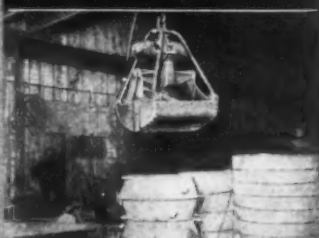
Having four different types of digging and rehandling buckets to draw from, makes a Hayward recommendation absolutely unbiased.

THE HAYWARD CO.
46-50 Church St., New York, N. Y.
405 Chester Twelfth Bldg., Cleveland, Ohio.

Hayward Buckets



ON THE JOB IN
FACTORY and FOUNDRY
with
HAYWARD ELECTRIC
MOTOR BUCKETS



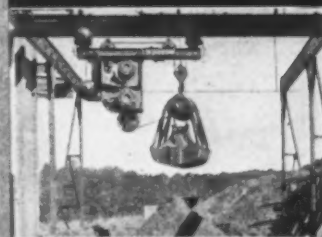
This Hayward saves labor
by digging and handling
foundry sand inside the
plant.



Feeding coal from stock-
pile to bins of boilers, is
part of this bucket's daily
job.



A Hayward Electric Motor
Clam Shell taking a load of
foundry sand from storage.



Hayward versatility enables
cranes, to handle all types
of loads, including coal.



Orange Peel • Clam Shell
Drag Line • Electric Motor

BUFFALO SCALES

FOR THE

IRON AND STEEL INDUSTRY

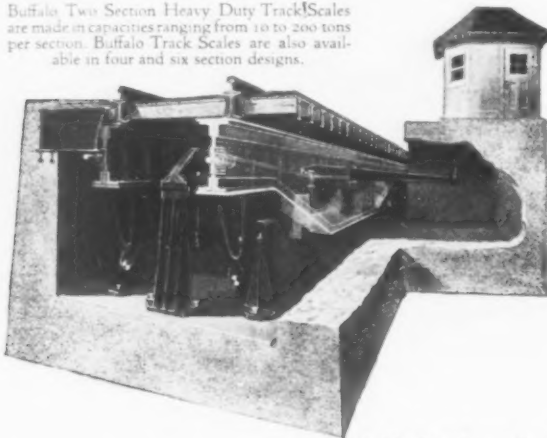
The increasing use of Buffalo Scales by leaders in the iron and steel industry can be explained in only one way . . . these scales have demonstrated their ability to weigh accurately day after day . . . year after year . . . under the hardest demands of service.

This exceptional accuracy is due largely to the high efficiency of their Suspension Bearings, which by reducing friction to a minimum, add greatly to sensitivity and weighing precision.

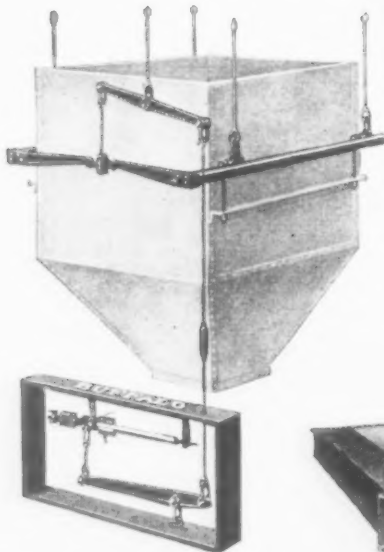
Users will tell you, and we believe comparative checking will convince you that Buffalo Scales are worthy of your most careful consideration when you select a new scale for plant or yard service.

Write for complete descriptive catalog.

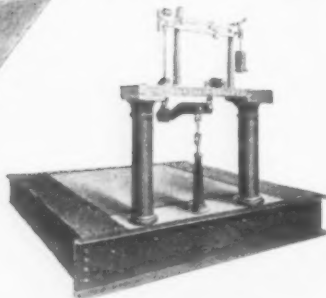
Buffalo Two Section Heavy Duty Track Scales are made in capacities ranging from 10 to 200 tons per section. Buffalo Track Scales are also available in four and six section designs.



Buffalo Pipe Lever Suspension Scales, 1000 to 50,000 pounds, are made to fit any size hopper, and may be hung from beams, placed on stands, or on crane or larry car.



Buffalo Heavy Duty Dormant Scale. Self-contained. Constructed entirely of metal, except for shelf and platform. Capacities . . . 2500 to 10,000 pounds. Platform size as desired.



BUFFALO SCALES

"THE TRUSTWORTHY"

BUFFALO SCALE COMPANY, INC.

BUFFALO	PITTSBURGH	CLEVELAND	CHICAGO
NEW YORK	DETROIT	SYRACUSE	DALLAS

CLEVELAND TRAMRAIL SYSTEMS



Move it While You Make It

Cleveland Electric Tramrail
Division of
The Cleveland Crane & Engineering Co.
Wickliffe, O.

CRANES EUCLID AND HOISTS

"Raise Profits"

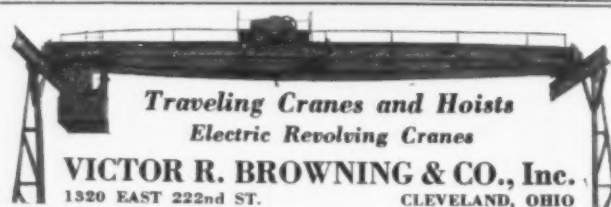
THE EUCLID CRANE & HOIST CO.—EUCLID, OHIO

INDUSTRIAL EQUIPMENT

ARMINGTON

FOR HANDLING MATERIAL

THE ARMINGTON ENGINEERING CO.
EUCLID Write today for Catalog OHIO



Traveling Cranes and Hoists
Electric Revolving Cranes

VICTOR R. BROWNING & CO., Inc.
1320 EAST 222nd ST. CLEVELAND, OHIO



SHAW ELECTRIC CRANES
PUTNAM MACHINE TOOLS

Manufactured by

MANNING, MAXWELL & MOORE, INC.
100 East 42d Street, New York City

Conco

TRAVELING CRANES & I BEAM TROLLEYS

Write for New Catalogue

CONCO CRANE & ENGINEERING WORKS

MAIN OFFICE
307-Y STREET
MENDOTA, ILL.

DIVISION OF
H.D. CONKEY & COMPANY

SALES OFFICES
IN ALL PRINCIPAL CITIES

BEDFORD CRANES



Made in all capacities—Overhead or Gantry
—to suit individual requirements. Floor,
cage or remote control.

Bedford Steel Stiffleg or Guy Derricks.

Bedford Foundry & Machine Co.
BEDFORD, IND.



P&H

Traveling
Cranes and Hoists

Harnischfeger
Corporation
Established 1884
Crane and Hoist Division
4401 W. National Ave.
Milwaukee, Wis.
Ask for Bulletin



You Get More for Your Money When You Buy Box Cranes + + +

That, bluntly, is the reason why so many leading firms install Box Equipment . . . "You get more for your money when you buy BOX CRANES" because Box passes on to you the benefits of *standardization* in superior design, construction, and added strength, *at a price that is no greater than that of "just any good crane."*

... Also:

—Box makes the unique "LHR" Electric Crane, a heavy-duty crane of one, two and three-tons capacity, which operates in less space and gives greater hook approach in all directions than any other standard crane. Also, Box "LOAD LIFTER" Electric Hoists, from 500 lbs. to 10-tons capacity. They have many exclusive Box features, such as patented one-point, forced feed and splash lubricating system—steel suspension—interchangeable mounting—ball bearing motors,—and equipped throughout with "Hyatt" Roller Bearings.

—Box Type "C" Electric Traveling Cranes, for instance—chosen by such exacting industrial leaders as Heintz Mfg. Co., City Auto Stamping Co., New York Rapid Transit Co., General Electric Co.—has a lower unit cost through "standardization," and the saving is found in the crane itself in the form of heavier construction, finer workmanship, oversize parts, greater factor of safety, longer service life.

Type "C" is a heavy-duty Electric Traveling Crane, produced at mass production costs in large quantities—that's why you get more for your money! Investigate the Box Line. *Write for Literature.*

Bulletins on Request

BOX CRANE & HOIST CORPORATION

East Ontario and Janney Streets

PHILADELPHIA, PA.

BRANCH OFFICES, NEW YORK—CHICAGO—BIRMINGHAM
REPRESENTATIVES IN PRINCIPAL CITIES

Established 1878

"One of the Pioneer Crane Builders"

Electric
Traveling
Cranes

Grab Bucket
Operating
Cranes

Hand-
Operated
Traveling
Cranes

Electric Hoists

Monorail
Hoists

Jib Cranes

Special
Cranes
For
Special
Conditions

LARGEST BUILDERS OF THE WORLD'S LARGEST CRANES

Alliance Products

STANDARD CRANES
Up to 430 tons capacity
STRIPPING CRANES
Up to 320 tons capacity
COMBINATION CHARGERS
and **STRIPPERS**
Up to 200 tons capacity



Ladle Cranes
Ingot Strippers
Soaking Pit Cranes
Open Hearth Charging Machines
Slab and Billet Charging and Drawing Machines
Gantry Cranes
Ore and Coal Bridges
Car Dumpers
Forging Manipulators
Steam Drop Forge Hammers
Coke Pushers, Levelers and Door Lifters
Coal Pier Equipment
Rolling Mill Machinery
Cement Plant Machinery
Dock Handling Equipment
Coke Oven Equipment

248 of 100 Ton Capacity and over

LADLE AND STANDARD CRANES

58	100 tons
1	WORM DRIVEN Ladle.. 100 tons
1	115 tons
1	WORM DRIVEN Ladle.. 125 tons
1	125 tons
44	150 tons
1	WORM DRIVEN Ladle.. 150 tons
1	WORM DRIVEN Ladle.. 160 tons
1	WORM DRIVEN Ladle.. 165 tons
1	WORM DRIVEN Ladle.. 175 tons
1	175 tons
1	WORM DRIVEN Ladle.. 200 tons
1	200 tons
1	225 tons
1	250 tons
1	WORM DRIVEN Ladle.. 250 tons
1	250 tons
1	275 tons
1	430 tons

STRIPPING CRANES

8	100 tons
1	125 tons
21	150 tons
17	200 tons
1	Single Ram, 320 tons

COMBINATION CHARGERS AND STRIPPERS

3	100 tons
1	125 tons
3	150 tons
1	200 tons

Give Us the Runway and We will Lift the World

THE ALLIANCE MACHINE CO.

ALLIANCE, OHIO, U.S.A.
ENGINEERS AND BUILDERS



Maris Brothers Electric Cranes

Crane shown is one of many that have been giving satisfaction for the past 15 or 20 years. This crane is installed at a steel foundry where it must be on the job every day operating in dust, dirt, heat and fumes and where it has been giving excellent service despite the hard usage.

Electric Cranes
Hand Mono-Rail
Electric Mono-Rail

Equipment for Every Hoisting Requirement

Let us send you our catalog; it will help you to select the best type for your purpose.

MARIS BROTHERS, Inc.

5538 Grays Ave., Philadelphia, Pa.



AMERICAN "HY-HOOK" CRANES & HOISTS



First to be equipped with roller bearings.

First to be equipped with hardened steel pinions and forged steel gears.

First to adopt all-steel arc welded construction.

The three distinguishing features of all modern cranes.

THE

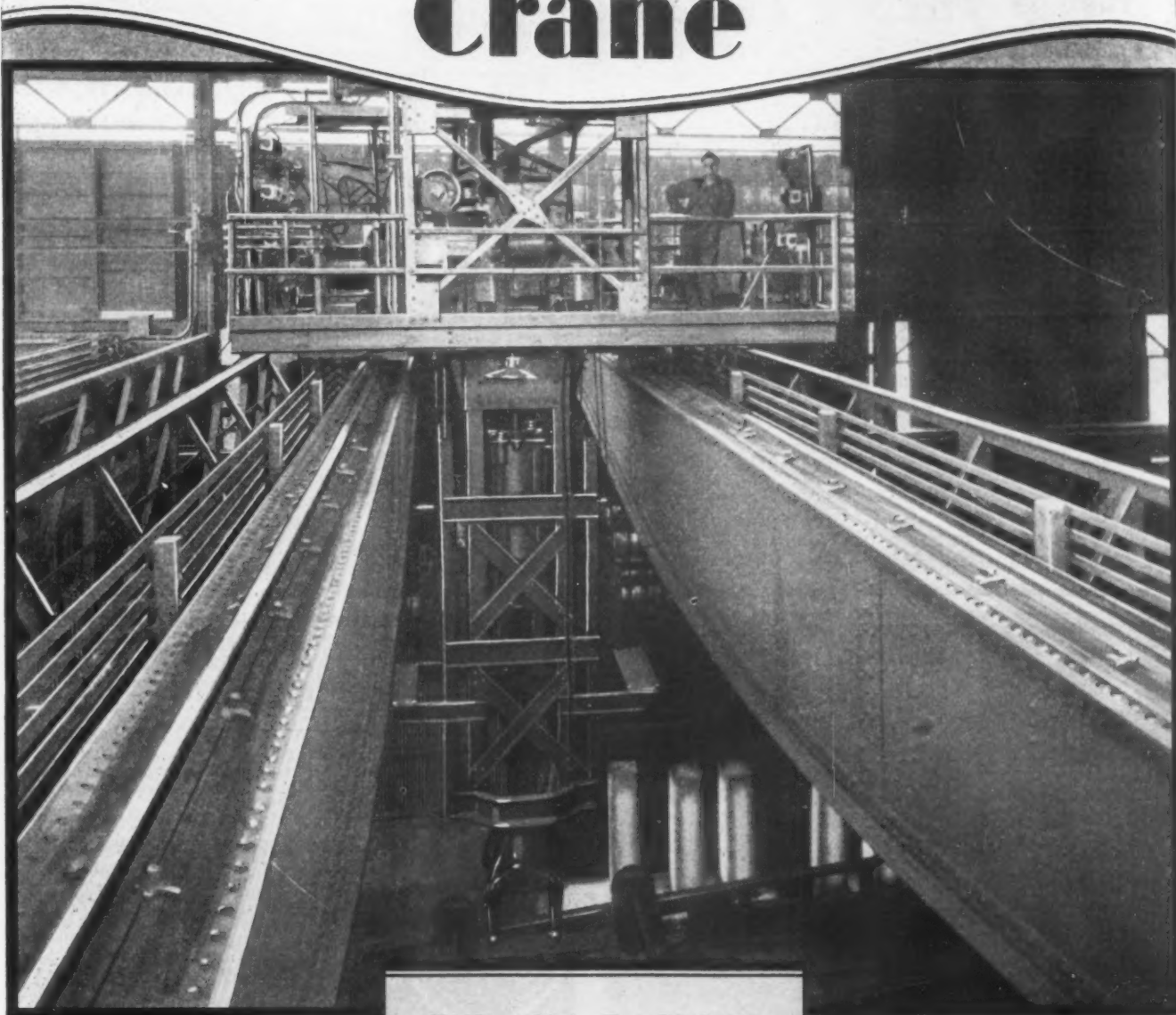
AMERICAN CRANE CO., Inc.

FRIENDSHIP, N. Y.

NEW YORK OFFICE, 30 CHURCH ST.

MORGAN

Worm Type Soaking Pit Crane




7½ Ton 4-Girder Type Pit Crane.
Worm Operated Trolley. Auxiliary girder on each side of bridge for supporting bridge motors.

THE
MORGAN ENGINEERING
COMPANY

NEW YORK 25 BROADWAY ALLIANCE, OHIO, U.S.A. PITTSBURGH 1420 OLIVER BLDG.
Designers - Manufacturers - Contractors
Steel Plant Equipment - Forge Shop Equipment - Special Machinery Of All Kinds

<p>TRAVELING CRANES GANTRY TYPE CRANES ... DERRICKS ... ROTATING DERRICKS DRILLING and REAMING MACHINES ... WRITE for LITERATURE ...</p>	<h1>LAKE SIDE</h1> <p><i>Dynamic</i> CRANES</p>	<p>BRIDGES and BUILDINGS AIRCRAFT HANGARS TAINTER GATES for DAMS ROCK GATES and OPERATING MACHINERY ... WRITE for LITERATURE ...</p>
<p>LAKE SIDE BRIDGE & STEEL CO., 302 VILLARD AVE., MILWAUKEE, WIS.</p>		

For Your
Yard
Work



CORDUROY CRANES P&H

Equipped with hook, bucket, clamshell or magnet, they can easily handle any kind of loose materials. Easily maneuvered on their Corduroy traction—no tracks required.

HARNISCHFEGGER CORPORATION
Established 1884
4401 W. National Ave., Milwaukee, Wis.

Ask for
Bulletin

Mechanize Your Material Handling
by installing American MonoRail—
Releasing Expensive Labor for Other Tasks



THE AMERICAN MONORAIL CO.
13104 ATHENS AVENUE CLEVELAND, OHIO

CANTON PORTABLE CRANE




The Load Stays Put

On this Canton the "tail can't wag the dog," neither can the load unwind the hoisting drum. A new Safety Friction Load Brake prevents this, and makes the Canton the safest of portable cranes. Put a Load Brake on your old Canton Cranes, too. It's easily and cheaply done.

Canton Foundry & Machine Co.
Canton, Ohio
New York Office: 154 West 57th St.,
Carnegie Hall

DEPENDABLE

Locomotive Cranes, Gantry Cranes,
Flexible-Tread Cranes, Shovels,
Draglines and Ditchers,
Truck Cranes, Road-Wheel Cranes,
Clamshell & Orange-Peel Buckets



ORTON CRANE & SHOVEL CO.
608 S. Dearborn St., Chicago, Ill.

ORTON
Cranes, Shovels & Buckets

OHIO

THE CRANE WITH THE 10 YEAR
GUARANTEE



STEAM
GAS OR
ELECTRIC

15
TO
60 TON
CAPACITY

LOCOMOTIVE CRANES

GANTRY CRANES, BARGE CRANES, BALLAST
CRANES, ERECTION AND LOGGING CRANES
CRAWLER CRANES AND SHOVELS

The Ohio Locomotive Crane Company
BUCYRUS, OHIO

Ohio LIFTING MAGNETS

are long lived

All insulation is asbestos. They have maximum lifting capacity. Outer pole has no through holes; it does not loosen, wears slowly and seldom breaks.

THE OHIO ELEC. MFG. CO., 5908 Maurine Ave., Cleveland, O.

ELM LIFTING MAGNETS—
BRAKES—COMPENSATORS—
MANUAL & MAGNETIC CONTROLLERS
LIMIT STOPS—AUTOMATIC STARTERS
THE ELECTRIC CONTROLLER & MFG. CO.
2700 EAST 79TH ST.
CLEVELAND—OHIO

A Complete Line of Overhead MATERIALS HANDLING EQUIPMENT



Reading Chain & Block Corporation
Reading, Pennsylvania

TRAVELING CRANES · TRANSFER CRANES · JIB CRANES
ELECTRIC HOISTS · MONORAIL SYSTEMS · CHAIN BLOCKS

LOW HEADROOM

HAND AND ELECTRIC HOISTS AND CRANES
for every purpose. Write for catalogs.

ROBBINS & MYERS, INC.
Hoist and Crane Division, Springfield, Ohio

THE USEFULNESS of a Browning is unlimited! Any place there is handling to be done a Browning Truck or Crawler Crane will get it done faster and more economically. And Browning speed and economy is matched by Browning long life and low maintenance.

THE BROWNING CRANE CO.
16226 Waterloo Road
CLEVELAND, OHIO, U. S. A.

Branch Offices: New York, N. Y., Chicago, Ill.

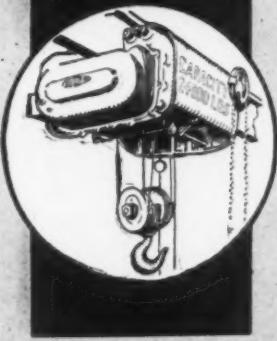
DISTRIBUTORS:

Birmingham, Portland, Syracuse, San Francisco, Charlotte, N. C., Kansas City, New Orleans, Los Angeles, Indianapolis, Montreal, Toronto, Toledo, O., Albany, Tulsa, Okla., Baltimore, Victoria, B. C., Minneapolis, Tacoma, St. Louis, Pittsburgh



A Browning Crawler Crane on a Chicago construction job for C. H. Jenswold Steel Erecting Co.

STEAM - GAS - ELECTRIC LOCOMOTIVE - TRUCK - CRAWLER - CRANES BROWNING



LO-HED
ELECTRIC
HOIST

1/4-ton to 12-ton
capacity

AMERICAN ENGINEERING COMPANY
2410 Aramingo Avenue Philadelphia, Pa.

TERRY STEEL DERRICKS and DERRICK FITTINGS

For General Construction and Material Handling Work

AMERICAN-TERRY-DERRICK CO.
SOUTH KEARNY, N. J.

DETROIT HOISTS

ELECTRIC and PNEUMATIC
CAPACITIES 1/4 to 10 TONS

DETROIT HOIST & MACHINE CO.

Write us concerning Hoists!

Write us concerning hand chain hoists. We make the well-known Peerless Hoist (the "unbreakable") which has, in addition to all-steel design, the strongest gearing it is possible to make—guaranteed for five years against abnormal wear or break. Bulletins at request.



THE HARRINGTON COMPANY
PHILADELPHIA

HANNA AIR HOISTS

Price is a small fraction of any other type of Power Hoist

HANNA ENGINEERING WORKS
1761 ELSTON AVE., CHICAGO, ILL.

ROEPER ELECTRIC HOISTS

ROEPER CRANE & HOIST WORKS, Inc.
READING, PA.

NC

**NORTHERN
HI-LIFT**

**This is
True
Economy**

—the modern way is the Northern Hi-Lift Electric Hoist — safe, reliable and profit bringing.

There is a Hi-Lift for your own particular problem — write for Bulletin EH-113A.

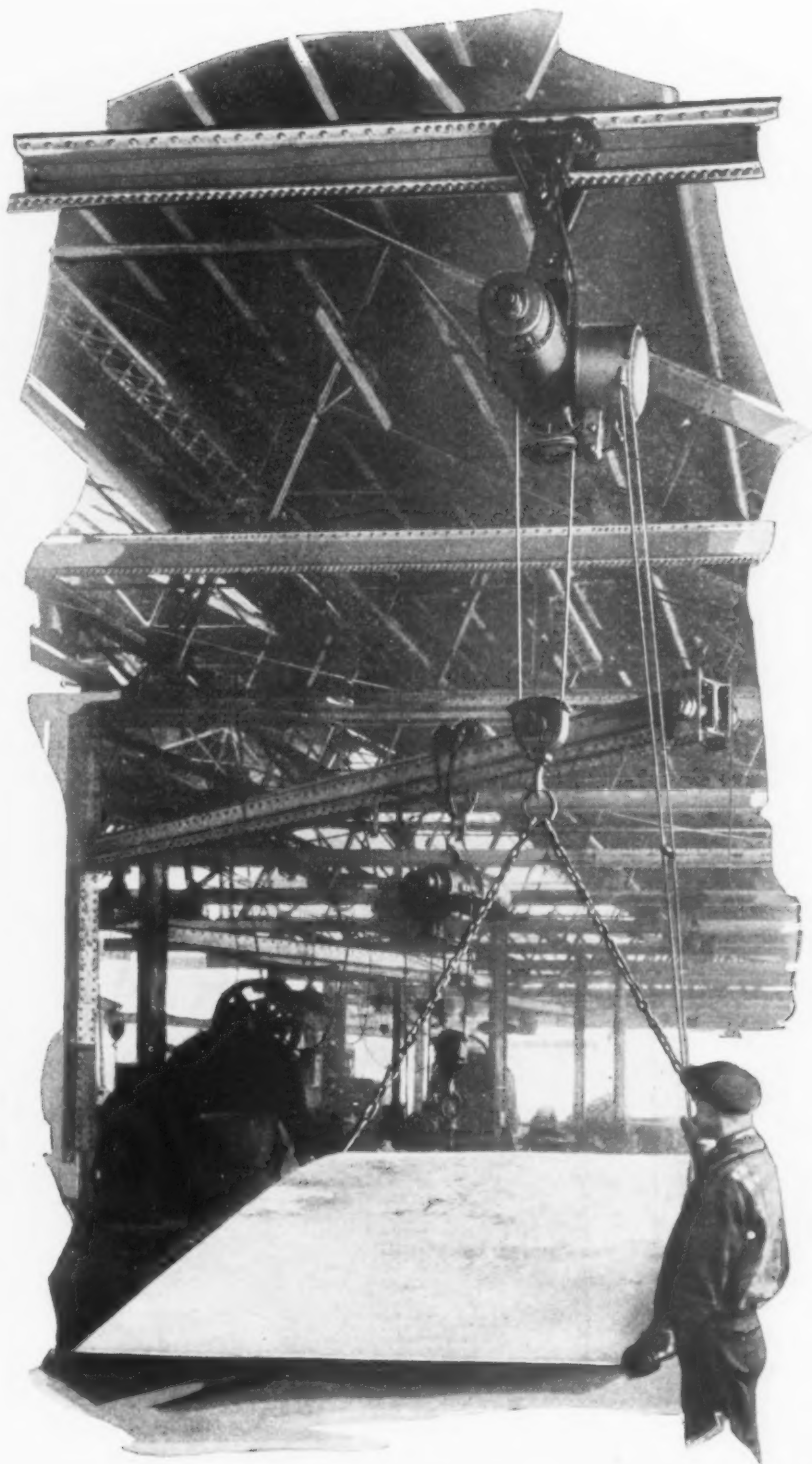
**NORTHERN ENGINEERING
WORKS**

DETROIT MICHIGAN

CANADIAN PLANT — NORTHERN CRANE & HOIST WORKS LTD. WALKERVILLE, ONT.

Unwieldy loads are handled with ease

by Shepard Electric Hoists



ONE hand does the lifting, no matter how clumsy the load, when a Shepard acts as a helper. Up a fraction of an inch, or the full height of lift . . . every motion is under perfect control of the operator. Load handling is always faster, more economical and easier with a Shepard Electric hoist.

And the service of a Shepard is lasting. The "balanced" drive runs smoothly in a bath of oil. Total enclosure excludes dust, dirt and corrosive fumes from the working mechanism. Maintenance is reduced to a minimum.

There are numerous places in every plant where these untiring helpers should be helping to cut handling costs. Some typical applications are given in the "Book of Illustrated Economies". You may find some helpful suggestions within its pages. Write for a copy.



SHEPARD NILES CRANE & HOIST CORP.
Main Office: 356 Schuyler Ave., Montour Falls, N. Y.
Works: Montour Falls, N. Y., and Philadelphia, Pa.

SHEPARD

CRANE & HOIST DIVISION

THE MOST COMPLETE LINE OF



CRANES & HOISTS IN AMERICA

GUARANTEED

UNION Hoists

will give years of satisfaction



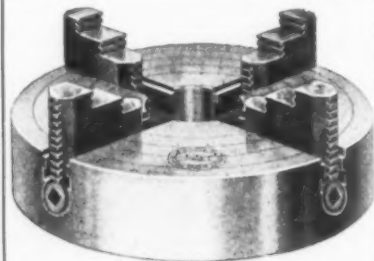
**UNION
Spur Gear
Hoist**

*Also Army
Type and
Twin Hook*

Sizes
1/4 ton to
20 tons
Complete
line of
Trolleys

Cincinnati
306 Sycamore St.

Reversible Load Sprocket
(an exclusive feature)
insures twice the durability of
usual hoist construction
Large Roller Bearings
Solid Load Axle Alloy Steel
Cut Alloy Steel Gears
Electrically Welded Tested Chain
Forged Steel Hooks
All in Steel Suspension
Tested to 150% Rated Capacity



No. 264
Steel Independent Chuck with
extra large Jaws and Screws

UNION CHUCKS

Every Modern Type

"NOW IS THE TIME"

To Scrap Old and Worn Chucks

MODERN TOOLING

Requires accurate Chucks to obtain
high production.

WE FURNISH EVERY TYPE

Independent
Universal Scroll
Heavy Duty Turret
Bull Dog Grip Face Plate Jaws

Ask for complete catalogues.

UNION MANUFACTURING CO.
New Britain, Conn.

BRANCH OFFICES CARRYING STOCKS:

Cincinnati
306 Sycamore St.

New York
26 Cortlandt St.

1. Van Tassel
410 First Nat'l Bank Bldg., Houston, Tex.

Chicago
27 S. Jefferson St.

San Francisco
661 Folsom St.



PLYMOUTH GASOLINE & DIESEL LOCOMOTIVES

from 2 to 80 Tons

WRITE FOR PERFORMANCE BULLETINS
PLYMOUTH LOCOMOTIVE WORKS
PLYMOUTH, OHIO



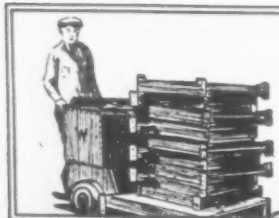
LEWIS-SHEPARD COMPANY

122 WALNUT STREET, WATERTOWN STATION, BOSTON, MASS.



Trucks and Trailers Industrial Cars

The Chase Fdy.
& Mfg. Co.
Columbus, Ohio



Insist on the

**RIGHT
TRUCK**

WRIGHT-HIBBARD INDUSTRIAL ELECTRIC
TRUCK CO., INC.

Phelps

New York

Colson

INDUSTRIAL TRUCKS

Whatever your trucking requirements may be, there is a model in the Colson line suited to your particular needs. Many years' close contact with material handling requirements has enabled us to produce a line of trucks unrivaled for smoothness of operation and long, trouble free service.

An all-steel truck built for hard work and to stand abuse. Steel angle frame, heavy cross slats, pipe push handles and annular ball bearing steel wheels—all features contributing to the strength and all-around usefulness of this hand truck.



Model
No. 1054

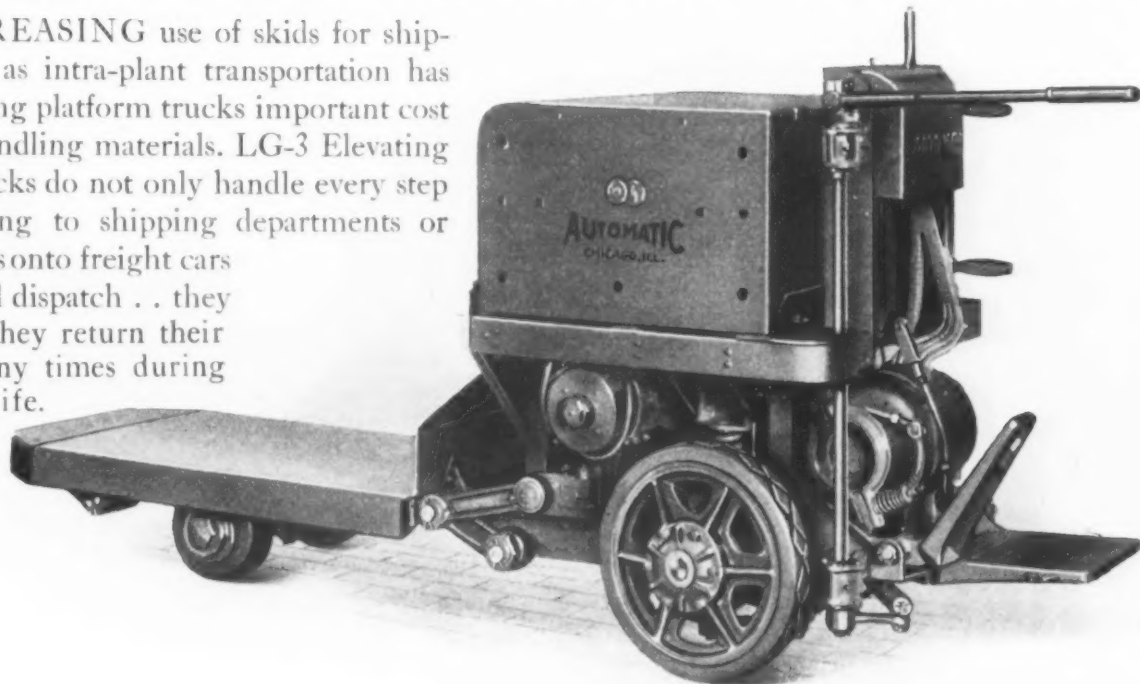
The Colson Company, Elyria, Ohio

Branches in Principal Cities

AUTOMATIC

ELECTRIC MATERIAL HANDLING EQUIPMENT

THE INCREASING use of skids for shipping as well as intra-plant transportation has made elevating platform trucks important cost savers for handling materials. LG-3 Elevating Platform trucks do not only handle every step from receiving to shipping departments or loading docks onto freight cars with ease and dispatch . . . they do more . . . they return their first cost many times during their useful life.



Here are some features that put LG-3 Trucks well in the lead:

"LG-3" trucks have rugged chassis—built with low center of gravity.

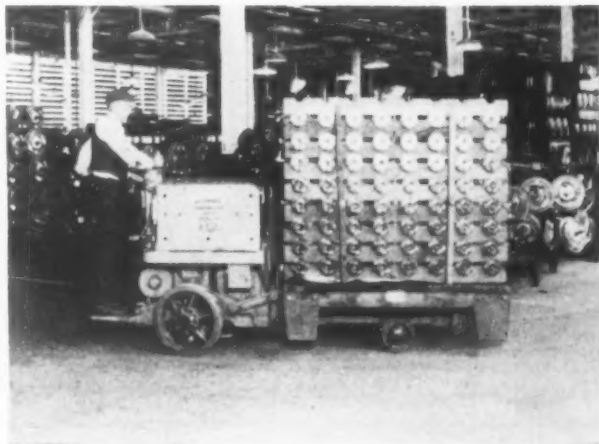
"LG-3" trucks are powered by spur gear drive—maximum power transmission from battery to tires.

"LG-3" traction units are built with double reduction spur gear drive. Full floating *chromium plated* drive shafts with splined ends. SKF self aligning ball bearings on shafts. Timken bearings on wheels. Large oversize tires and heavy duty motor.

"LG-3" trucks have laterally pivoted front axles to take up road inequalities without transmitting the strain to frame members.

"LG-3" hoist units are equally efficient spur gear reduction units—designed to quickly raise or lower the load.

"LG-3" platforms are built with heavy steel tapered and bevel nose bumpers. They go under depressed skids at an angle.



Automotive industries were among the first to recognize the importance of these trucks for skid handling.

Critical engineers will appreciate the excellent performance of LG-3 Elevating Platform trucks. Write for detailed information on this popular cost-saver, or call our nearest representative.

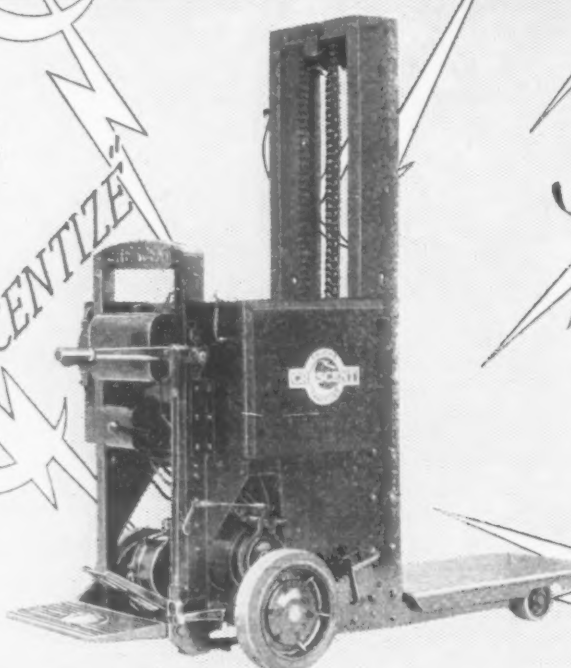
AUTOMATIC TRANSPORTATION COMPANY

Pioneer Manufacturers of Industrial Trucks and Tractors for Every Material Handling Purpose

Affiliated with Barrett-Cravens Co., Chicago, Manufacturers of Hand-Lift Trucks, Lift-Truck Platforms, Portable Elevators, Structural Steel Storage Racks and Barrel Trucks; also Walker Vehicle Co., Chicago, Manufacturers of Electric Street Trucks and Tractors.

101 WEST 87th STREET, CHICAGO, ILL.

*IT
PAYS
TO
CRESCENTIZE*



New.

BEFORE YOU PURCHASE
YOUR NEXT TRUCK CHECK
OVER THE NEW CRESCENT
TIER LIFT.
BUILT FOR 7" SKIDS

CRESCENT TRUCK CO. Lebanon, Pa.

16 Years of Experience Building All Types of Electric Industrial Trucks, Trailers and Tractors

ATLAS CARS

Storage Battery
Locomotives & Tractors



THE ATLAS CAR & MFG. CO.

ENGINEERS

1140 Ivanhoe Road
CLEVELAND, OHIO MANUFACTURERS

FOUNDRY MOLDING MACHINES
MODERN STANDARD SPECIAL
POURING DEVICES LIGHT CRANES

ARCADE MANUFACTURING CO.
FREEPORT, ILL., U. S. A.

An Opportunity to Save Money
Finest Quality—Clean—Evenly Graded

CHILLED SHOT SHARP GRIT

All sizes continuously carried in stock.
Complete sample sizes and price list gladly mailed.

PATCH-WEGNER CO., Inc., Rutland, Vt.
PATCH-WEGNER CORP.
35 Boulevard, Long Island City, N. Y.

HERMAN

Jarr Independent Rollover
and Pattern Drawing

MOLDING MACHINES

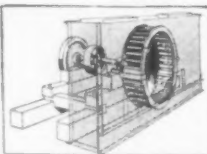
Send us your inquiry and
our Service Department will
gladly advise with you on
your requirements.

Herman Pneumatic Machine Co. General Offices:
Union Bank Bldg., Pittsburgh, Pa.

Bartlett - Snow

Foundry Sand and Mold Handling Equip-
ment, Elevators and Conveyors for all
Material Skip Hoists, Sand Conditioners,
Screens, Crushers, and Dryers.

The C. O. BARTLETT & SNOW CO.
6202 Harvard Ave. Cleveland, O.



SAND CONDITIONERS

Molding Machines

for production and
jobbing castings



Wm. H. Nicholls Co., Inc.
91st Ave. & 126th St., Richmond Hill, N. Y.

INDUSTRIAL SILICA SANDS
for blast furnace runners, open hearth and heating furnace bottoms, steel and
brass molding, sand blast, traction; also cores for iron, brass and aluminum.

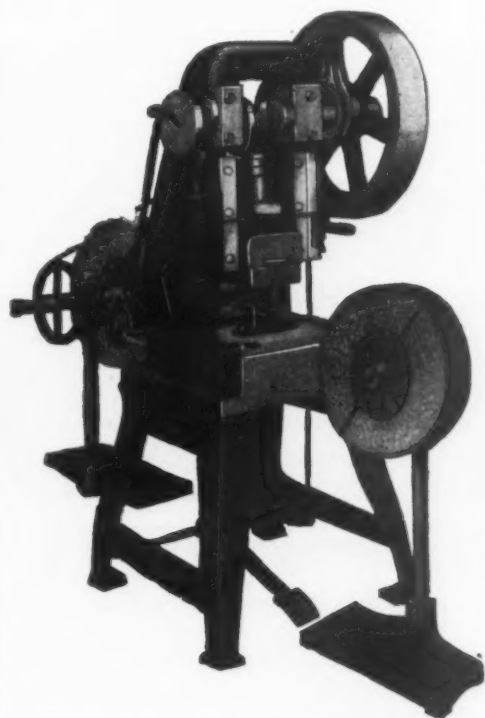
INDUSTRIAL SILICA CORP.
STAMBAUGH BLDG., YOUNGSTOWN, OHIO

These Two Machines

are the result of years of experience in the design and construction of labor-saving machinery.



THE BAIRD TUMBLING BARREL for burnishing, rust-proofing, etc.



The BAIRD AUTOMATIC POWER PRESS for stamping small metal parts.

"ASK BAIRD
ABOUT IT"

BAIRD EQUIPMENT

is

Modern Equipment

IN these days of keen competition, the shop that is not adequately equipped is sadly out of the running. The LEADER has always been the chap who saw the trend of the times and availed himself of the best it had to offer. In a word, he was modern. He realized the vital necessity of that added bit of strength that good tools give every craftsman. And he was prepared.

For seventy years BAIRD has been making Modern Machinery, the best that the times had to offer. During that period vast changes have come over the industrial world. But one principle remains the same: Machine Equipment must be Modern. BAIRD Equipment is Modern and will continue to be Modern as long as people look to BAIRD for Leadership.

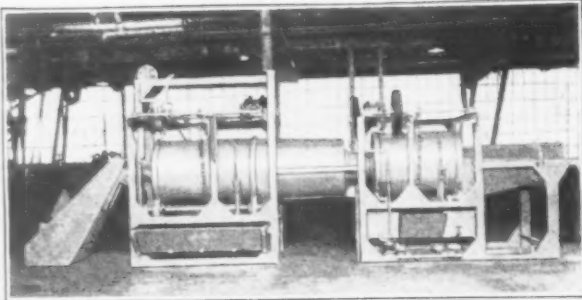
BAIRD Automatic Machinery for making parts from wire and ribbon metal.

BAIRD Automatic Die Punch Presses for high-speed blanking machines.

BAIRD Tumbling Barrels for burnishing and rust-proofing quantities of small parts are all just examples of Modern, Efficient Machines.



THE BAIRD MACHINE CO.
BRIDGEPORT, CONN.



Догнать Россию

(TRANSLATION:
Catching up with Russia)

In the Amo Truck plant, in a suburb of Moscow, Russia, an Ideal Star Return Tumbling Barrel installation is at work, cleaning forged parts for motor trucks. This equipment was selected by the engineers on the basis of its performance on similar work in American forging plants.

The power loader of the Ideal barrel picks up a tote box full of forgings and charges the drum. There the forgings float in an excess of stars and steel grit, never touching each other. Scale is completely removed, thus increasing production in subsequent machining operations. Pressure on a button empties the barrel, the parts and tumbling material are automatically separated, the latter returning automatically to the barrel. The forgings are discharged into a drum which feeds a conveyor belt taking them to the next department.

In America

Many an American forge shop has still to "catch up with Russia" in the rapid, economical removal of scale from forgings. Will you let our engineers discuss that with your engineers? No obligation.

Put it up to
Specialists

N. Ransohoff Inc.

W. 71st St. at Millcreek, Carthage, Cincinnati, O.

THE STACEY ENGINEERING CO.
[Blower Division]

Rotary Positive

Blowers	Vacuum Pumps
Gas Pumps	Acme Blowers
Exhausters	Acme Gas Pumps
Meters	Victor Blowers
Liquid Pumps	Victor Gas Pumps
"Cycloidal" Pumps	

THE CONNERSVILLE BLOWER CO. INC.
WILBRAHAM-GREEN BLOWER CO.
THE P. H. & F. M. ROOTS CO.
Connerville, Indiana

Chicago Mount & Kentucky Aves New York
20 N. Wacker Drive 420 Lexington Ave.

CAPE MAY SAND
PARTICULARLY ADAPTED FOR SAND BLAST
CORE SAND and FURNACE BOTTOM
CAPE MAY SAND COMPANY
512 WASHINGTON ST. CAPE MAY CITY, N.J.





SCRAP MONEY

GET the valuable iron out of foundry refuse mechanically with a High Duty Magnetic Separator. Three separations—iron, sand and slag—without hand labor. Pays for itself in savings; 75c. to \$1.20 on every ton refuse. Write for catalog.

MAGNETIC MFG. CO.
626 South 28th St., Milwaukee, Wis.

STEARNS MAGNETIC SEPARATORS

**THE IRON YOU
SAVE**

Let us
send you
details

*more than
pays the cost*

Dings
MAGNETIC
SEPARATION

DINGS MAGNETIC SEPARATOR CO.
727 Smith Street
MILWAUKEE, WISCONSIN

SIMPSON
INTENSIVE SAND MIXERS
SAND HANDLING AND PREPARING
EQUIPMENT FOR THE FOUNDRY

NATIONAL ENGINEERING CO.
549 W. WASHINGTON BLVD CHICAGO, ILL.

PANGBORN
SAND BLASTS AND
DUST COLLECTORS

For every industrial requirement
Pangborn Corporation - Hagerstown, Md.

SLYBLAST

for Sandblast • Shotblast • Gritblast
Sandblast • Tumbling Mills • Complete Installations with Dust Arresters
THE W. W. SLY MANUFACTURING COMPANY
CLEVELAND, OHIO
OFFICES IN ALL PRINCIPAL CITIES

DEPENDABLE FOR TWENTY-ONE YEARS

NOW!**ABBOTT**

Has perfected *further* their process of *controlled* heat treating. Uniformly hard, mirror-finished and sound, Abbott Burnishing Balls form the proper basis for better and more economical finishing.

The Abbott Line is complete, including a dependable material for every kind and shape of burnishable work, from 1/16" balls (over 27,000 per pound) for burnishing many jewelry items, up to 1/2" for more rugged jobs. The offering is then rounded out with cones, pins and slugs for use with balls to burnish thoroughly into those "hard-to-get-at" places—recesses and sharp angles.

All kinds and sizes are available immediately from stock. Ask for samples of the items you use or an "Abbott Sample Kit"—it includes samples of all.

THE ABBOTT BALL COMPANY*"Originators of Commercial Ball Burnishing"**Also manufacturers of the Abbott Burnishing Barrel.***1047 NEW BRITAIN AVENUE, HARTFORD, CONN.****MOTT****SAND-BLAST MFG. CO. INC.**

Sand Blast Machines and Allied Equipment
GENERAL OFFICE AND WORKS:
4611-4621 Flournoy Street Chicago, Ill.

UNION STEEL CASTING CO.
PITTSBURGH, PA.

ANNEALING BOXES & BOTTOMS
ACID OPEN HEARTH
STEEL CASTINGS

Crucibles



Stopper Heads

ESTABLISHED 1871

THE VAUGHN
MACHINERY COMPANY
CUYAHOGA FALLS, OHIO.
ROD MILLS - DRAW BENCHES -
WIRE DRAWING AND HANDLING EQUIPMENT.
FOR STEEL, COPPER AND ALLOYS.



**The AETNA-
STANDARD**
ENGINEERING COMPANY
YOUNGSTOWN, OHIO



TUBE AND PIPE MILLS, TIN, STRIP AND SHEET MILLS, ROLLS

NATIONAL ROLL & F'DRY CO.
DESIGNERS AND BUILDERS OF
ROLLING MILL EQUIPMENT

CHILLED **ROLLS** SAND
AIR FURNACE CASTINGS
OFFICE AND WORKS AVONMORE, PA.

Buying Crucibles is Buying Service

GET ACQUAINTED:—Make your next order
for our Crucibles. They give satisfaction.

McCULLOUGH-DALZELL CRUCIBLE CO.,**Pittsburgh, Pa.**



ROLLING MILL EQUIPMENT FOR HOT OR COLD ROLLING

MILLS

MILL
REELS

COILERS

SLITTERS

WINDING
REELS

LEVELING
MACHINES

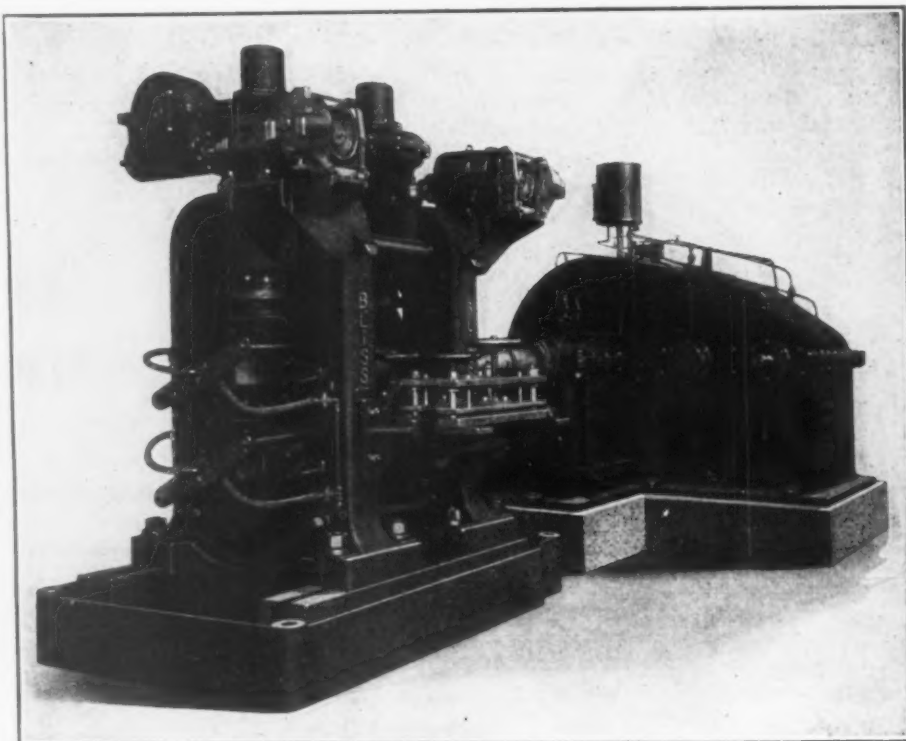
SHEARS

RECOILING
MACHINES

SCRAP-BAILING
MACHINES

ETC.

ETC.



BLISS TWO-HIGH MILLS ROLLER-BEARING EQUIPPED

These mills are built in all sizes and
roller-bearing equipped throughout.

Full details on request.

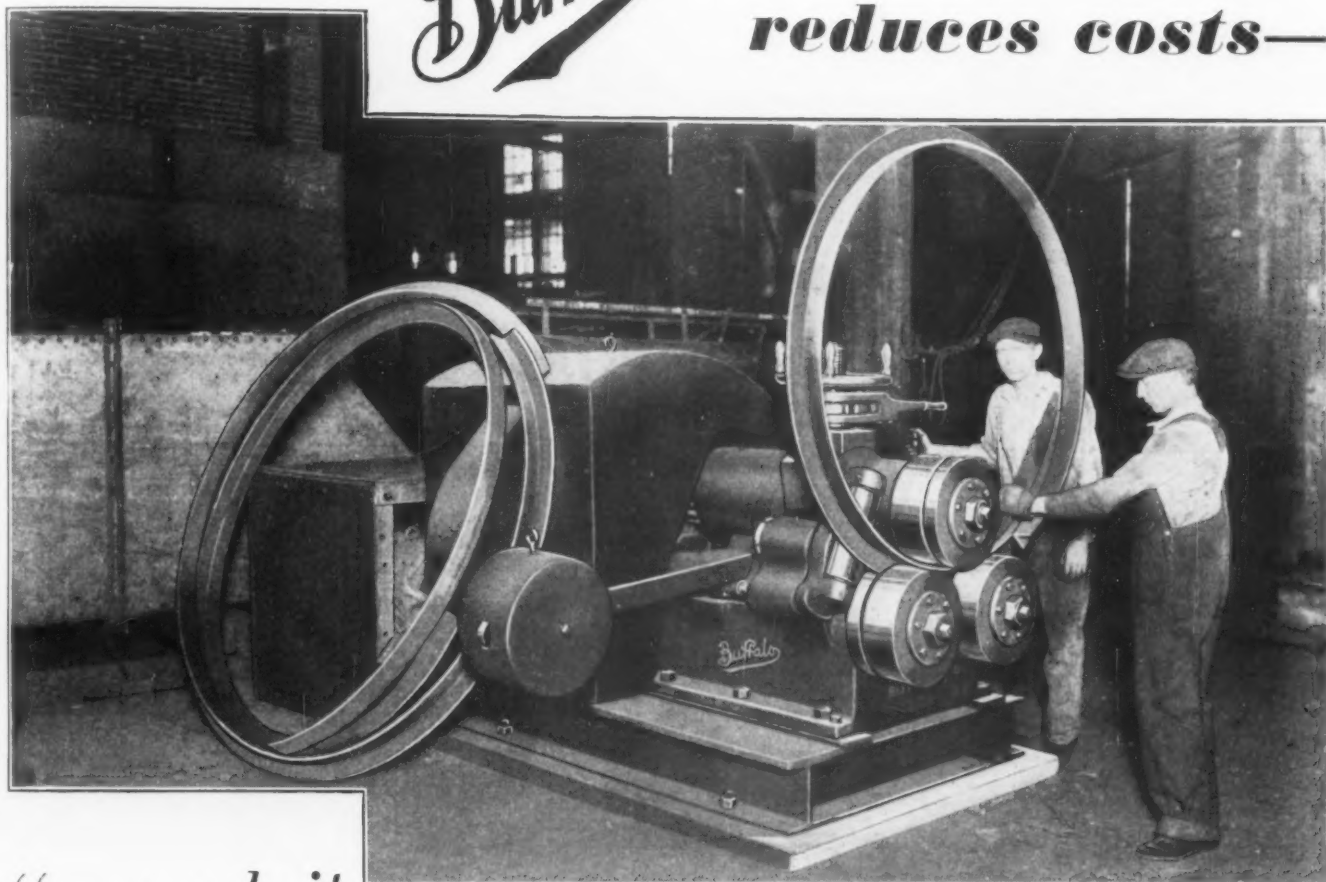
BLISS *for* **MACHINERY**

E. W. BLISS CO., BROOKLYN, N. Y., U. S. A.

Factories: BROOKLYN, N. Y. HASTINGS, MICH. SALEM, OHIO
Sales Offices: DETROIT CLEVELAND CHICAGO ROCHESTER
PHILADELPHIA CINCINNATI NEW HAVEN BOSTON
Foreign Factories and Offices: LONDON, Eng. TURIN, Italy PARIS, France

BLISS

This "Buffalo" Bending Roll **reduces costs—**



“—and it

*does a smooth job with
minimum number of passes”*

*To save time
and money
in making bends
of all kinds
—get a*

"Buffalo"

These are the exact words of the John Nooter Boiler Works of St. Louis, who find their Buffalo No. 2 Bending Roll a valuable addition to their shop. They have been using it for over a year and are well satisfied with the results.

The photograph shows the two employees handling one of their many jobs on the "Buffalo"—Bending

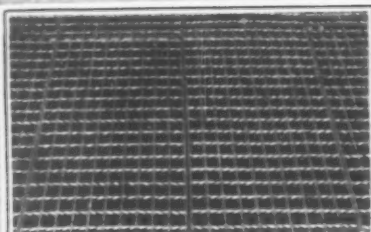
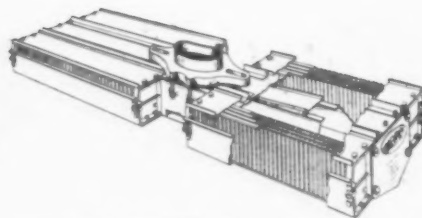
$3\frac{1}{2}$ v $3\frac{1}{2}$ x $\frac{3}{8}$ angles. The full capacity of the machine is 4 x 4 x $\frac{1}{2}$ ", leg out.

Maybe you have similar work, or work that a Buffalo Bending Roll could do quicker and for considerably less cost than you are doing it now.

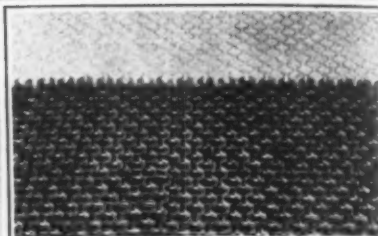
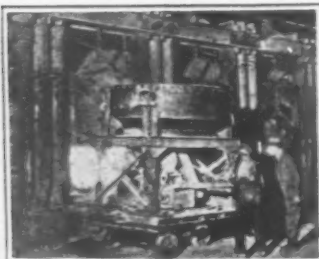
Why not let us give you the facts?

BUFFALO FORGE COMPANY
492 Broadway **Buffalo, N. Y.**

Canada: Canadian Blower & Forge Co., Ltd., Kitchener, Ontario

ELECTROFORMED ONE PIECE
STEEL GRATING

TRACYFIER (Steam Purifier)

FLOORGARD-ARMORING
FOR CONCRETE FLOORS

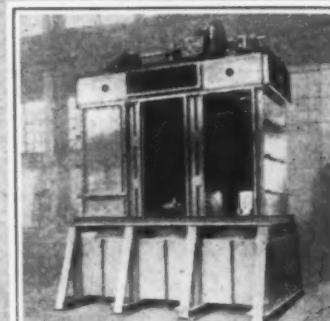
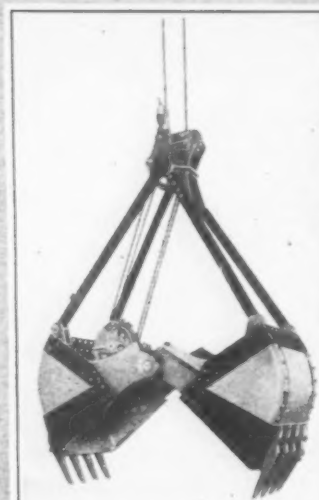
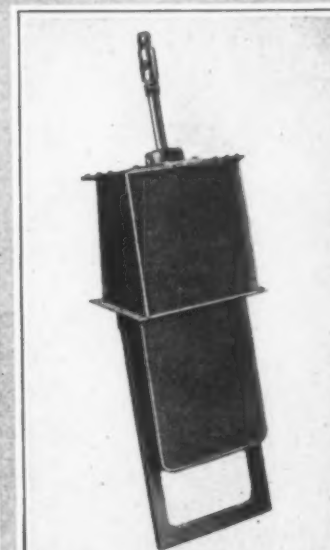
DOLOMITE MACHINES



STANDARD STEEL BUILDINGS



ELECTRIC DOOR HOISTS

REGENERATIVE
AIR PREHEATERSCLAMSHELL BUCKETS
with Ball-Bearing SheavesREVERSING VALVES
and Other Water-Cooled
Equipment for the
Steel Industry

BLAW-KNOX Products Reduce Plant Maintenance, Cut Production Costs and Increase Output

*Completely descriptive
literature on any Blaw-
Knox Product will be
sent on request. Write to
our nearest District
Office.*

BLAW-KNOX COMPANY

2007 Farmers Bank Bldg., Pittsburgh, Pa.

New York
Chicago
Boston

Philadelphia
Birmingham
Buffalo

Cleveland
Detroit
Baltimore

Export Division:

Blaw-Knox International Corporation,
Canadian Pacific Bldg., New York

London, England, New Oxford House, Hart St., Holborn,
W. C. 1.—Paris, France, 1 Rue de Clichy—Milano, Italy,
6, via S. Agnese, 6—Düsseldorf, Germany, 17 Bismarckstrasse

BLAW-KNOX

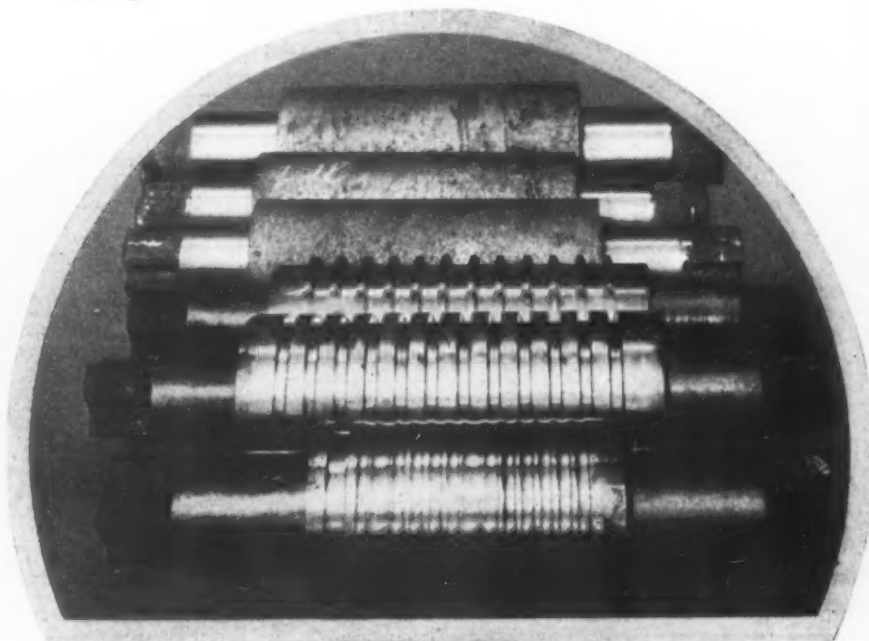
HOAGLAND CHILLED IRON ROLLS IN COMPETITION

Hoagland Rolls

Rolled 70987-250 lb. billets over a period of four months without refinishing.

A Well-Known Alloy Roll

Rolled 58298-250 lb. billets—lasted only three months without refinishing.



A Group of Hoagland Finished and Unfinished Rolls

Recently, in a competitive test conducted by a reliable company, Hoagland chilled iron rolls rolled 12,689 *more* billets and lasted a month *longer* than an alloy roll before refinishing was required.

Hoagland's long experience in the manufacture of rolling mills, rolling mill equipment, and chilled iron rolls is readily noticeable in the better design, higher production, and longer life of this equipment.

A complete engineering service is available for your special requirements. May we have the pleasure of serving you?



Rubber Roll

M. HOAGLAND'S SONS CO.

BUILDERS OF ALL TYPES OF METAL & RUBBER ROLLING MILLS
& EQUIPMENT—ALLIGATOR SHEARS, WIRE COILERS,
CAST IRON CHILLED ROLLS, UNIVERSAL
MILL COUPLINGS

ESTABLISHED 1840

ROCKAWAY, N.J.



ROLLS

CHILLED IRON AND IRON ALLOY

For Iron, Steel, Brass, Copper, Aluminum, Zinc and Nickel
For Hot Sheets, Tin Plate and Strip For Cold Sheets, Tin Plate and Strip
For Merchant Bars and Rods

Rolling Mill Equipment

Hot Saws
Foil Mills
Rod Reels
Billet Mills
Strip Reels
Mill Tables
Sheet Mills
Sheet Coilers
Hot Saw Tables

Mill Drives up to and including 6,000 HP
Shape Straightener Machines, up to and including 24" 1 beam
Motor Operated Screw-Down for Mill
High Speed Gear Sets for Continuous Rod Mills
Continuous Bar and Billet Mills
Roll Laths up to and including 60"
Cold Mills for Sheet and Strip
Rail Breakers

Bar Mills
Pinch Rolls
Bar Twisters
Merchant Mills
Sheet Mill Drags
Steam Doublers
Rail Stitting Mills
Rail Re-rolling Mills
Universal Mill Spindles

SHEARS

Vertical Alligator Cropping Plate Squaring
Automatic Dumping Table for Bar Shears

Special Machinery

Ingot Turning Machine for Blooming Mill Vertical Edging Stands Motor Driven Furnace Billet Pushers
Gear Cutting Machine Work Automobile Spring Testing Machines Iron Castings Steel Castings

LEWIS FOUNDRY & MACHINE CO.

P. O. BOX 1591

PITTSBURGH, PA.

TAYLOR-WILSON MFG. CO.

ENGINEERS-FOUNDERS-MACHINISTS

TUBE MILL EQUIPMENT

FOR THE MANUFACTURE OF SEAMLESS
LAPWELD, AND BUTTWELD TUBING

GREY IRON AND SEMI-STEEL CASTINGS
MACHINE MOULDED GEARS
AND MACHINE WORK

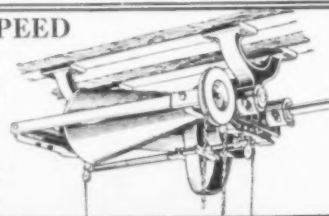
OFFICE AND WORKS: McKEES ROCKS, PA.
(PITTSBURGH DISTRICT)

EVANS VARIABLE SPEED COUNTERSHAFT...

Provides a 6 to 1 speed variation,
with clutch; Can be stopped and
started at any speed; Speed can
be changed without stopping.

Catalog on Request

Evans Friction Cone Co.
Newton Highlands, Mass.
A. Warden & Co., 48 Shepherdess Walk,
City Road, London, E. C., England



POOLE QUALITY

Flexible Couplings
Reduction Gears
Cast Gears
Special Machinery

POOLE ENGINEERING & MACHINE CO.
BALTIMORE, MARYLAND

ROLL LATHES

The Hyde Park kind are manufactured from
correctly made castings, of heavy and rigid
construction and built to last many years.

ROLLS

Sand and Chilled

ROLL LATHES IRON CASTINGS
TIN PLATE MACHINERY

Hyde Park Foundry & Machine Co.
HYDE PARK (West Penn. Div. P. R. R.) PA.

Handled by an experienced
mill man. Tell us when you
expect to place your next
order.

TEST SPECIAL

Lowers your Belting cost by giving the
best results for a reasonable expenditure
WATERPROOF FLEXIBLE STRONG
Write for Belt Engineering Booklet

RUBBER
BELTING

NEW YORK BELTING & PACKING CO.
NEW YORK-CHICAGO-PHILADELPHIA-PITTSBURGH-BOSTON-ST. LOUIS-SAN FRANCISCO

FOR INCREASED PRODUCTION

"WHITNEY"

SILENT CHAIN DRIVES

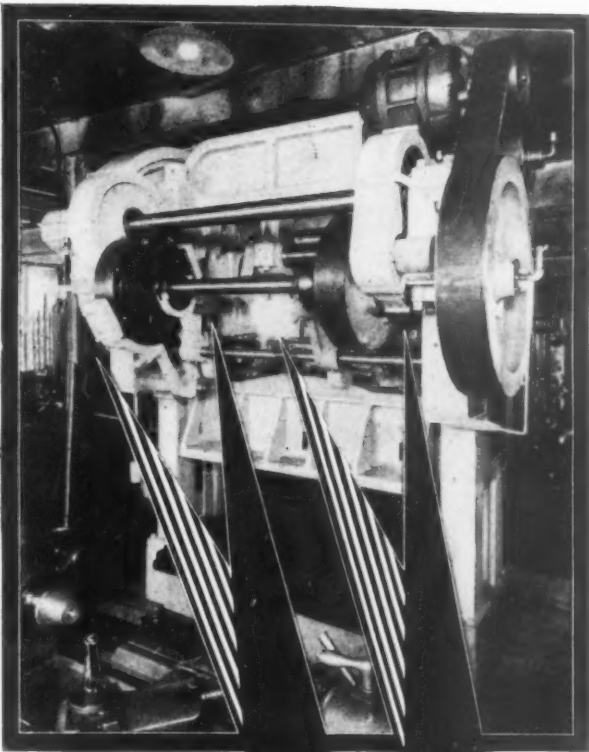
POSITIVE

FLEXIBLE

DURABLE

THE WHITNEY MFG. CO.

Hartford, Conn.



Williams, White & Co.,
No. 6-72 Double
Crank Tie Rod Press
—72 in. between
 housings, with 6 in.
stroke. Capacity,
130 tons.

WHEN A REVERSING TIE ROD PRESS WAS WANTED...

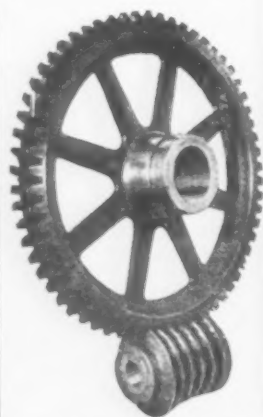
A Detroit tool and die company needed a tie rod press for testing the stamping and forming dies they build for the automotive industry. They wanted the advantage of a *reversing drive*. Williams, White & Co., Moline, Illinois, gave it to them . . . by equipping the press with Twin Disc Clutches: 18 inch, cone action type, with non-friction surfaces.

The same hand lever operates both clutches, one for forward motion, the other for reverse motion. The brake, which was added, is in engagement with the clutch lever in neutral position to prevent the ram coasting.

For special jobs, there is placed at your disposal the invaluable experience of our Engineering Research Department . . . equipped to co-operate with you *all the way*. Write for Engineering Data Book or specific recommendations. *Twin Disc Clutch Company, Racine, Wis.*

Designers of modern machine tools consider Twin Disc as clutch headquarters for clutches that are as adaptable as they are dependable. The variety and number of stock model clutches, and the advantageous combination of volume production and precision workmanship, make the use of Twin Disc Clutches economical as well as practical.

TWIN DISC
CLUTCHES



HINDLEY WORM GEARS

Send us your inquiries for
WORM GEARS AND
WORM GEAR REDUCTIONS

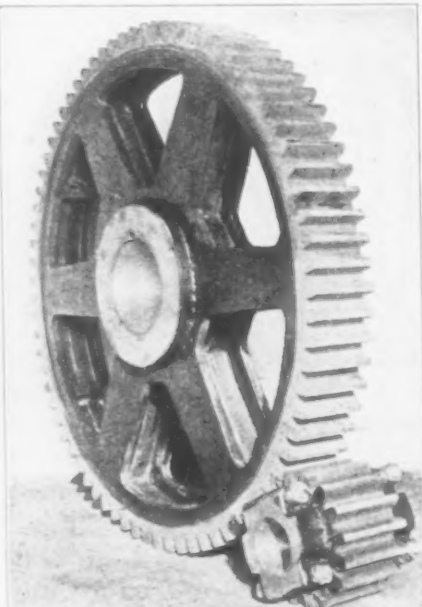
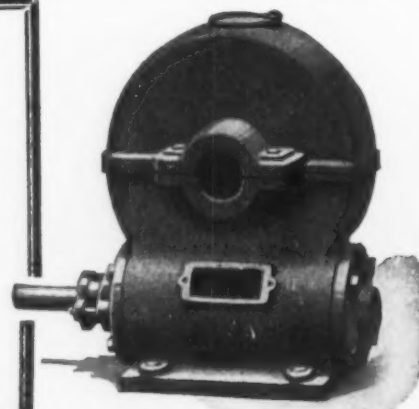
Catalogue on Request.

HINDLEY GEAR COMPANY

ENGINEERS

508 N. 19th Street

Philadelphia



**A
K
R
O
N**

AKRON GEARS

Mean Fewer Gear Replacements

We make them with the thought of "Service" constantly in mind. That's why every Akron Gear, large or small, gives the kind of service that keeps things going.

Let us quote on your requirements.

The Akron Gear & Engineering Co.
Akron, Ohio



SPROCKETS

Complete Stock for
Immediate Delivery

Our stock of gears and sprockets is complete in every way. Send us your order or inquiry for any size.

DUNDORE MANUFACTURING CO.
244 Orange St. Reading, Pa.



SPEED REDUCERS

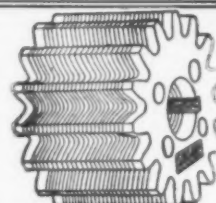
**CLEVELAND
WORM AND GEAR COMPANY**

3252 EAST 80th STREET ▼ CLEVELAND, OHIO

NON-METALLIC GEAR SPECIALISTS

Rawhide, Fabrolite, Bakelite
Rawhide blanks for gear cutters.
Any size—immediate shipment.

The Chicago Rawhide Mfg. Co.
1313 Elston Ave. Chicago, Ill.



**PHILADELPHIA
GEAR WORKS**



Branch Sales and Engineering Offices:
New York, 12 E. 41st St. Pittsburgh, Farmers Bank Bldg.

GRANT



WORKS

Prompt Attention

*both to special work and to orders
from our Complete Stock of*

Spurs Worm Gears
Bevels Reduction Units

Second & B Sts., Boston, Mass.

FERGUSON GEAR CO.

OUT GEARS CHAIN DRIVES
BEVEL SPUR SPIRAL WORM SPROCKETS
RAWHIDE, BAKELITE AND HARDENED STEEL PINIONS
Member American Gear Manufacturers Association

GASTONIA, NORTH CAROLINA

GEARS - WORMS - CAMS - MADE TO ORDER

HARTFORD GEARS

THE HARTFORD SPECIAL MACHINERY CO., Hartford, Conn.

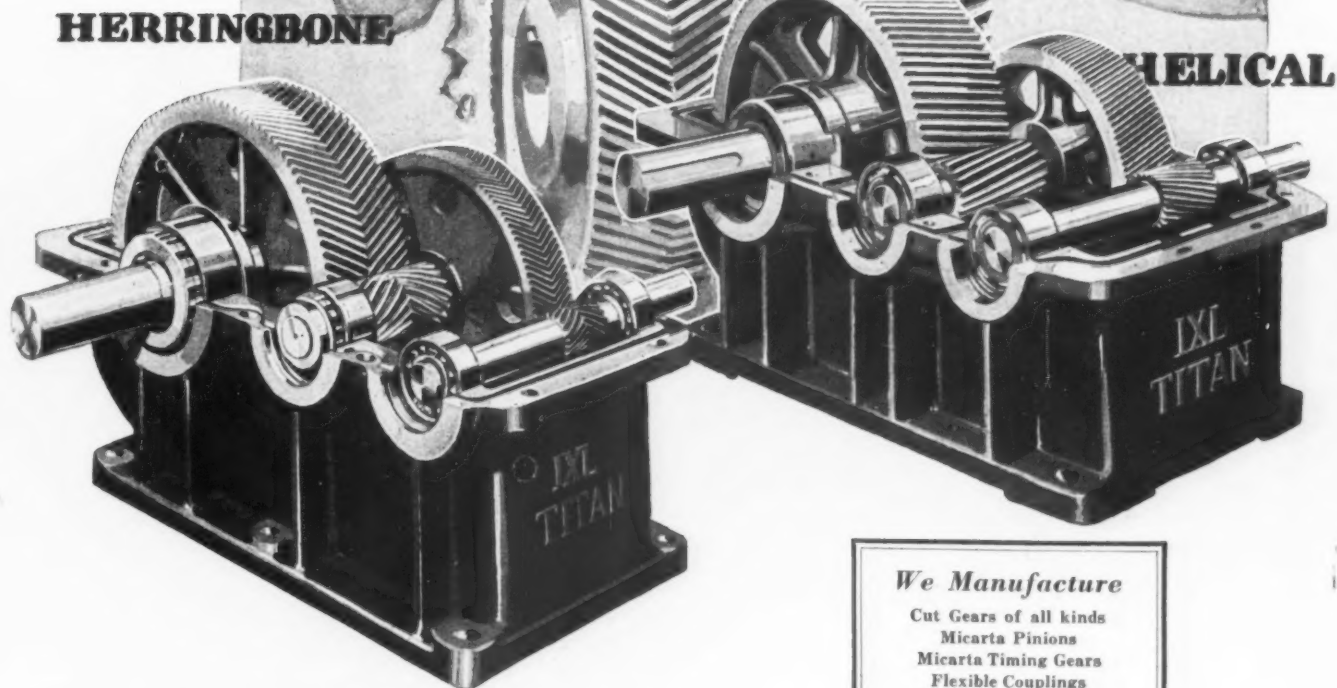
EARLE

The
Earle Gear & Machine Co.
4715 Stenton Ave.,
Philadelphia, Pa.
110 State St., Boston, Mass.
85 Liberty St., New York City

Cut Spur, Bevel, Herring-
bone and Worm Gears
All sizes. Every description. Oper-
ating Machinery for Bridges, etc.
"Lee Simpler" Cold Metal Saws.

GEARS

Heavy Duty TITAN SPEED REDUCERS



THE biggest factor in satisfactory service and long life is the proper selection of the right unit for your special requirements. Our Engineering Department is at your service to help select the proper drive for your special job.

There is a "TITAN" Reducer to fit every requirement in horsepower and reduction ratio. They are available in either herringbone or helical types.

IXL-TITAN Reducers are backed by over 70 years engineering and manufacturing experience.

Write for book giving complete information

FOOTE BROS. GEAR & MACHINE CO.

111 N. CANAL ST. Dept. 33 CHICAGO ILL.

Sales and Engineering Offices in All Principal Cities U. S. A. and Canada

We Manufacture

Cut Gears of all kinds
Micarta Pinions
Micarta Timing Gears
Flexible Couplings
Gear Racks
Speed Reducers
Special Machinery



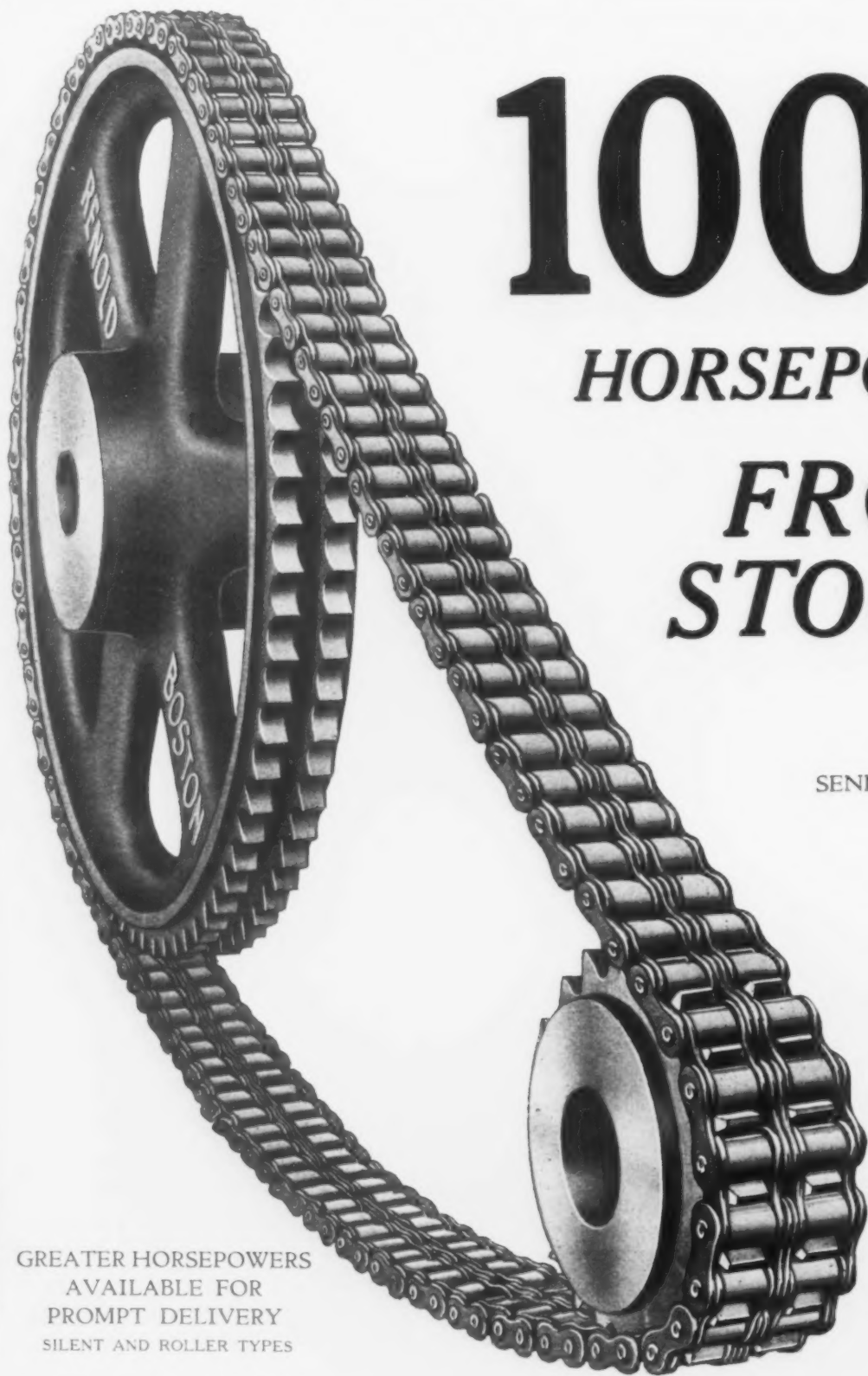
FOOTE
BROS.
GEAR &
MACHINE CO.
111 N. CANAL ST.
CHICAGO, ILL.

Dept. 33

YES, we would like to receive full information on the IXL "TITAN" Line.

Signed _____

Address _____



100

HORSEPOWER

FROM STOCK!

SEND FOR BOOKLETS

GREATER HORSEPOWERS
AVAILABLE FOR
PROMPT DELIVERY
SILENT AND ROLLER TYPES

SEE OUR EXHIBIT
AT THE NINTH
NATIONAL EXPO-
SITION OF POW-
ER AND MECHAN-
ICAL ENGINEER-
ING AT THE
GRAND CENTRAL
PALACE, NEW
YORK CITY, FROM
DEC. 1 to DEC. 6,
1930. BOOTHS
326 to 331.

BOSTON GEAR WORK SALES CO.

BOSTON

NEW YORK

PHILADELPHIA

CLEVELAND

NORTH QUINCY, MASS.

CHICAGO

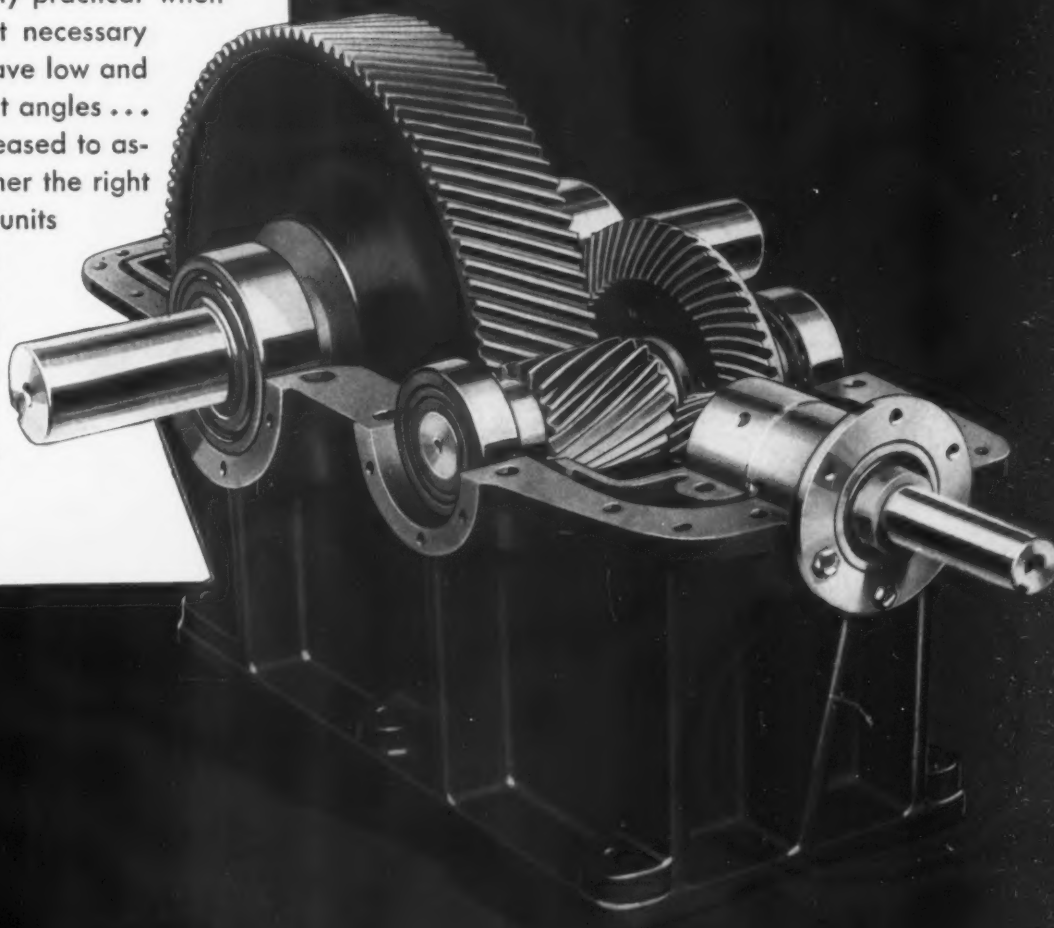
SERVICE STATIONS IN PRINCIPAL CITIES FROM COAST TO COAST

BOSTON GEARS

THOUGH long known as manufacturers of a very efficient, standardized line of Speed Reducers of the parallel shaft type, Falk has recently introduced a line of Right Angle Speed Reducers which embody many efficiency characteristics . . . This Right Angle Drive series is typically Falk — in design—in principles of good engineering—in careful, long-life construction—in high efficiency—in dependable, trouble-free performance . . . Falk Right Angle Reducers are to be preferred to worm drives because of their ruggedness, efficiency and cool operation. They are available in single, double and triple reductions, with ratios from 1.5:1 to 518:1. All bearing surfaces are fitted with roller bearings . . . Falk Right Angle Reducers are highly practical when space conditions make it necessary that the reduction unit have low and high speed shafts at right angles . . . Falk Engineers will be pleased to assist you in adapting either the right angle or parallel shaft units to your speed reduction problems . . . Falk parallel shaft units are carried in stock in single, double and triple reductions, ratios from 1.5:1 to 350:1.

FALK

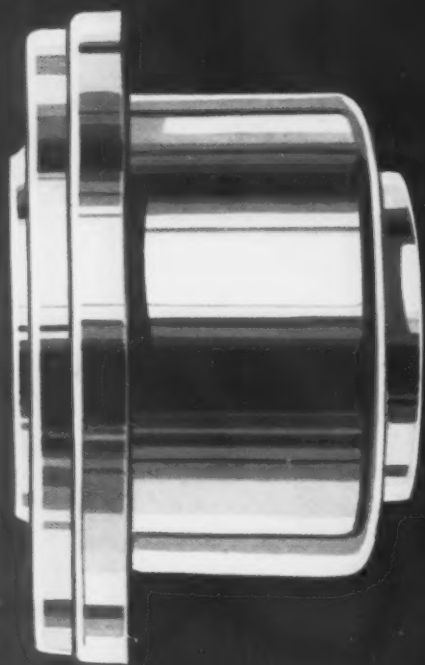
SPEED REDUCERS



FALK . . . A GOOD NAME IN INDUSTRY

FALK

FLEXIBLE COUPLINGS



Under Light Load — the spring rings fit in the grooves closely only at the outer ends. This gives a long free span between points of support and the power is transmitted throughout almost the entire length of the flexible rungs of the spring grid.



Under Normal Load — the radius of the arc shortens, thus securing greater strength in transmitting the load. The radius of the arc bears a definite relationship to the thickness of the spring bars and is designed so that when each bar is bent around this radius the stress in the spring cannot exceed a fixed safe value.



Under Severe Overload — the coupling is always flexible except under emergency conditions where the load becomes so great that the springs bear on the entire length of the grooves — when they come into direct shear. Then it is practically impossible to break the coupling as this would require a force sufficient to snap all the spring members at once.

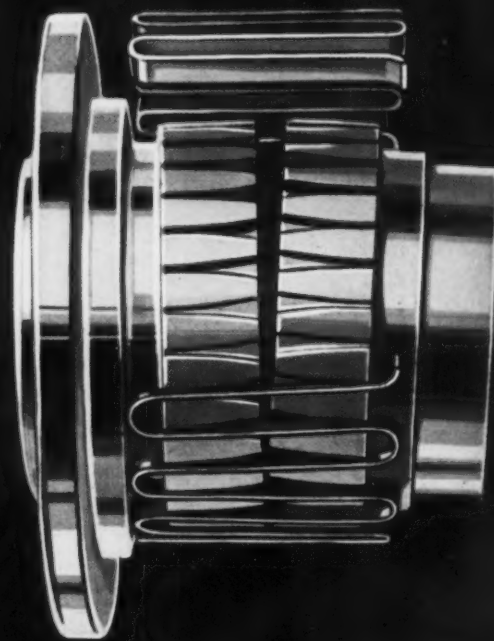
THE fundamental principles of design and operation embodied in the Falk Flexible Coupling are based on these necessary requirements: absorption of shocks and vibration, correction for both angular and parallel misalignment, allowance for free end float under load, ample provision for extreme overload over and above rated capacity! . . . The Falk Flexible Coupling meets all these requirements with an efficiency that surpasses that possessed by any other type . . . And furthermore, Falk Flexible Couplings are of all-steel construction . . . no gears, rubber, fabric or leather. Ample lubrication provides free, smooth, sliding contact between metallic rungs and teeth. Resistance to shear fifteen times maximum rated capacity load. Impossible for coupling to lock in position because of low surface friction between parts . . . Illustration at lower left explains operation in detail . . . Bulletin 180A contains complete story of why it pays to consult Falk first when it comes to couplings!

Manufacturers—Herringbone Gears, Speed Reducers, Flexible Couplings, Steel Castings and Oil Engines.

THE FALK CORPORATION—Milwaukee

NEW YORK	PITTSBURGH	KALAMAZOO	EL PASO
ALBANY	YOUNGSTOWN	CHICAGO	DENVER
ROCHESTER	CLEVELAND	MINNEAPOLIS	SALT LAKE CITY
BUFFALO	AKRON	ST. LOUIS	SEATTLE
BOSTON	DETROIT	BIRMINGHAM	SAN FRANCISCO
WILKES-BARRE	NEWAYGO	HOUSTON	LOS ANGELES

Canada: THE WILLIAM KENNEDY & SONS, LTD., OWEN SOUND, ONTARIO.
Branches: HALIFAX, MONTREAL, TORONTO, COBALT, WINNIPEG, VANCOUVER



FALK . . . A GOOD NAME IN INDUSTRY

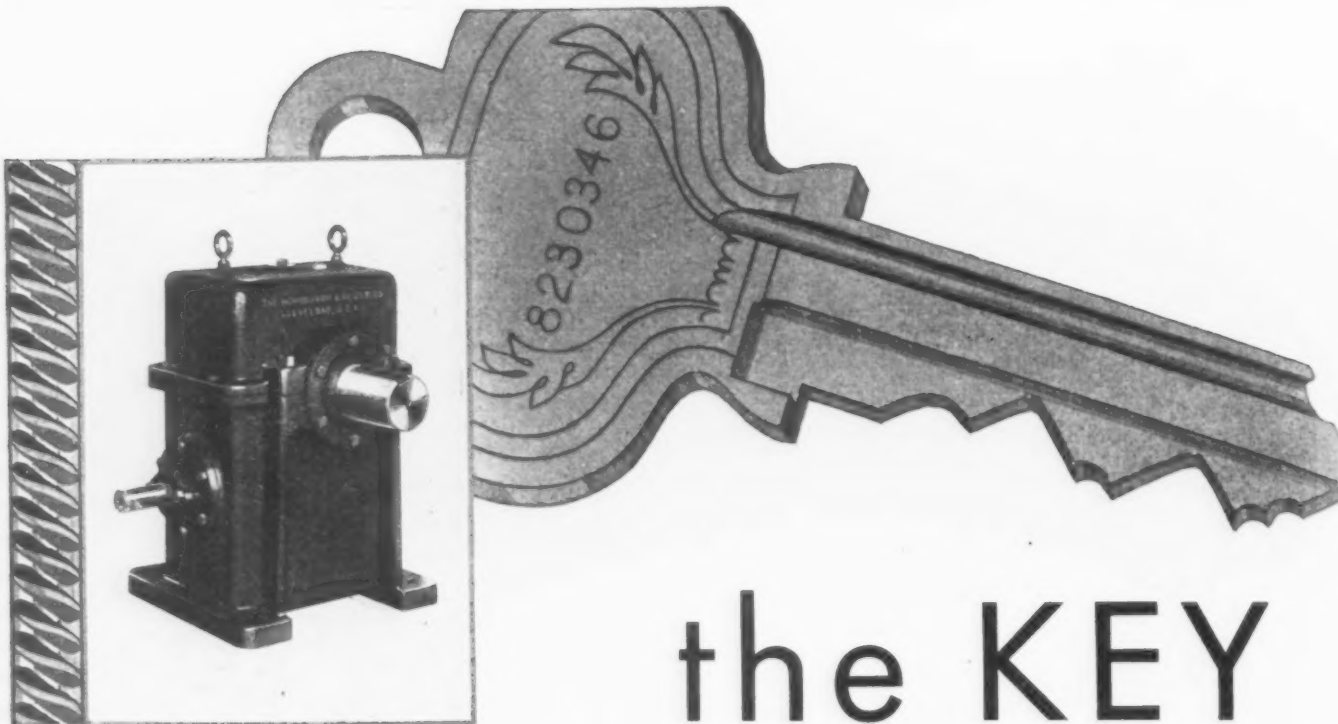
Jones

SPUR GEARS

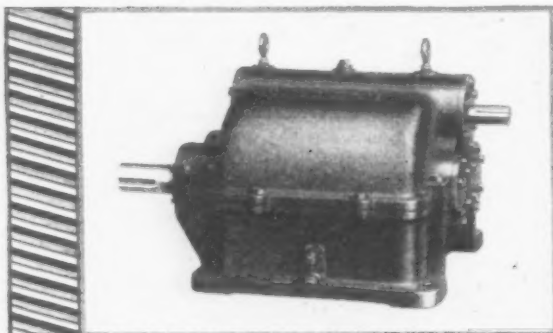


THE GEARS YOU BUY will purr through a long life or quickly grind themselves away—depending on the care with which they were manufactured and the original selection of the raw materials. Jones Spur Gears, like the rest of the Jones Gear family—worm, herringbone, mitre, or bevel—are accurately and sturdily made from the finest materials—cut or molded from steel, cast iron, or bakelite. Whatever your gear requirements may be, and whether your orders are large or small, our specialized equipment will take care of you quickly. Our sales and engineering offices are in all large cities. You will like the way we handle your orders.

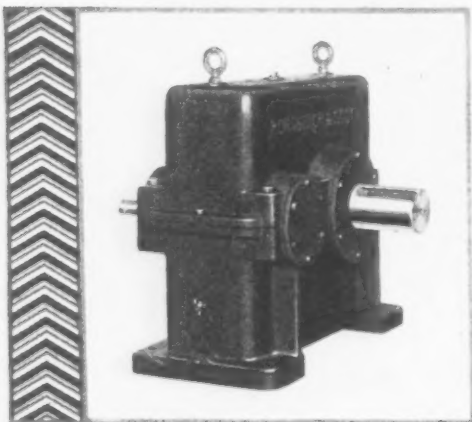
W. A. JONES FOUNDRY & MACHINE CO.
4401-4451 ROOSEVELT ROAD CHICAGO, ILLINOIS



Worm Gear Speed Reducer



Heli-Spur Speed Reducer



Herringbone Speed Reducer

Write for the Horsburgh & Scott Complete Speed Reducer Catalog including data sheets and other valuable information.

the KEY

. . . to every power transmission problem

IN steel plants, cement mills, lumber mills . . . wherever efficient, reliable transmission of power is desired, there is a Horsburgh & Scott Speed Reducer that fits the need as precisely as a key fits its lock.

Each of the three general types shown has its exclusive advantages . . . but all are alike in their trouble-free operation . . . their long life . . . their compact ruggedness . . . their smooth operation.

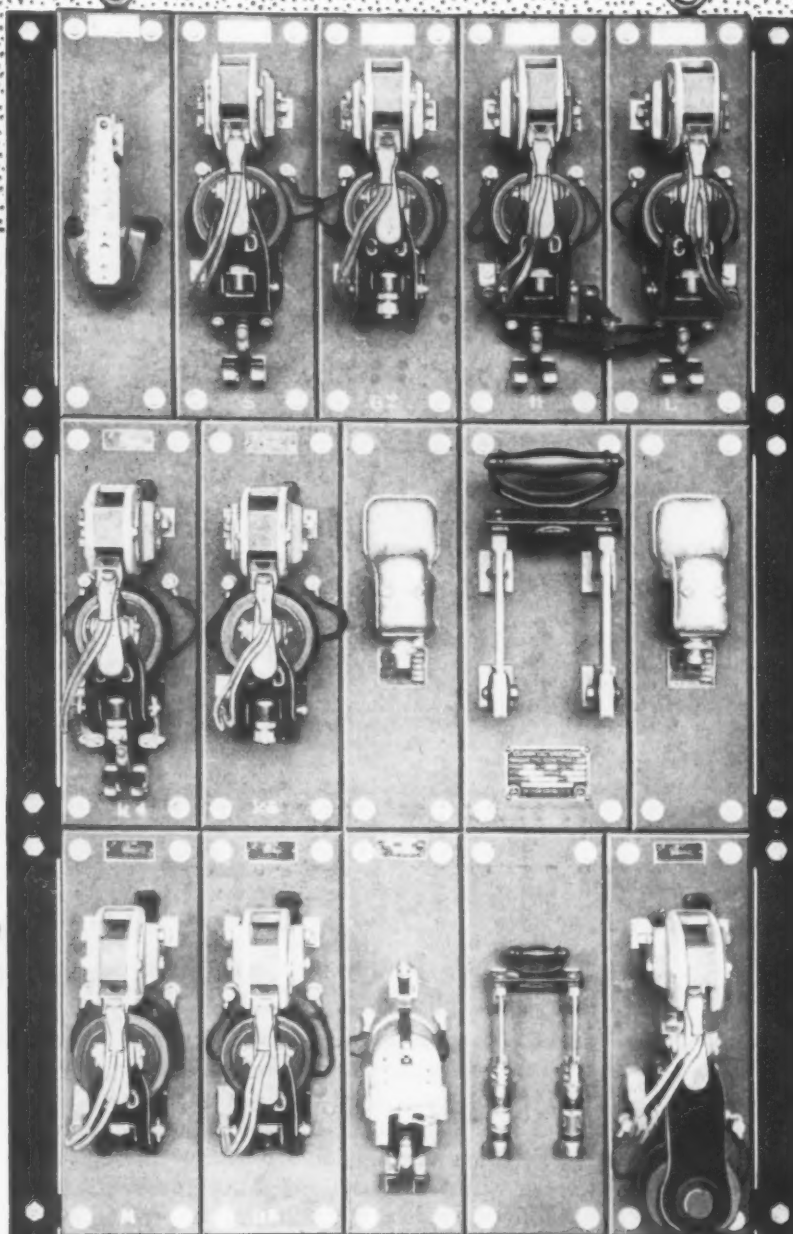
With this COMPLETE line of power transmission units, Horsburgh & Scott is qualified to give you unbiased recommendations, regardless of *which type* may be required to serve you best.

The ability and experience of our engineers is at your disposal. A request for cooperation will not obligate you in any way.

THE HORSBURGH & SCOTT CO.
CLEVELAND, U. S. A. SPEED REDUCERS
 AND GEARS



Clark "3C" Form S Dynamic Lowering Crane Hoist Controller



The most simplified Dynamic Lowering Magnetic Controller obtainable for Crane Hoists.

Satisfactory safe speeds lowering light or heavy loads and slow speed first point hoisting can easily be provided.

Write us for full particulars



THE CLARK CONTROLLER CO.

• PHILADELPHIA • CANTON, O. • CHICAGO • DETROIT • PITTSBURGH •

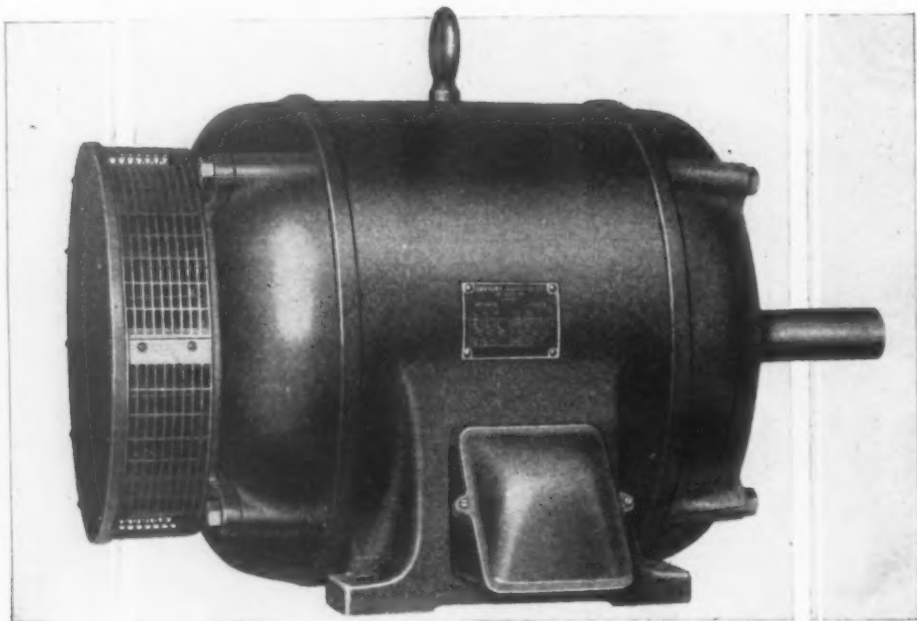
AGENCIES IN U. S. A.
BIRMINGHAM CINCINNATI
KANSAS CITY ST. LOUIS

CLEVELAND, O.

AGENCY IN CANADA
RAILWAY & POWER ENGINEERING
CORPORATION, LIMITED



THEY KEEP A-RUNNING



10 Horse Power Century Type SC Multi-speed Constant
Torque Squirrel Cage Induction 3 and 2 Phase Motor

TOTALLY ENCLOSED FAN COOLED MULTI-SPEED MOTORS

Constant Horse Power • Constant Torque • Variable Torque

These Multi-speed Motors have the added advantage of full protection to the stator, armature, and other internal parts of the motor, all of which are completely isolated from the outside air. They are particularly desirable in all installations where adjustable speed requirements must be met; and where dust or dirt are present in objectionable quantities—or where unusual dampness prevails such as in creameries, packing plants or outdoor installations.

They are built for 2, 3 and 4 speeds with wide or narrow speed ranges, such as 1800/1200 or 1800/600 down to 900/450 r.p.m. (60 cycle). Special speed combinations are available.

Built in standard sizes from $\frac{1}{4}$ to 125 horse power, in normal torque, high torque and normal or low starting current types.

CENTURY ELECTRIC COMPANY

1806 PINE STREET • ST. LOUIS, MO.

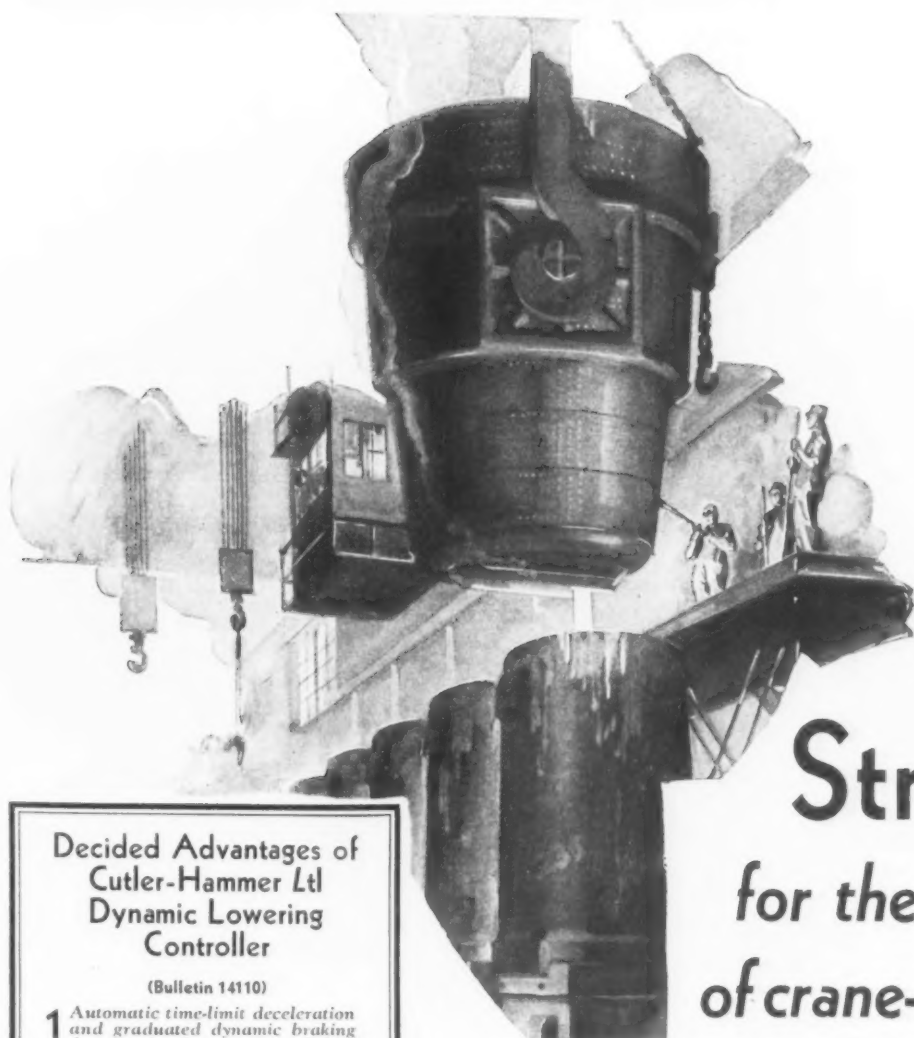
40 U. S. and Canadian Stock Points and More Than 75 Outside Thereof

SINGLE PHASE,
THREE PHASE,
AND DIRECT
CURRENT MOTORS

Century
MOTORS

MOTOR GENERA-
TOR SETS, ROTARY
CONVERTORS, FANS
AND VENTILATORS

FOR MORE THAN 26 YEARS AT ST. LOUIS



Decided Advantages of Cutler-Hammer Ltd Dynamic Lowering Controller

(Bulletin 14110)

- 1 Automatic time-limit deceleration and graduated dynamic braking for stopping from any speed. Particularly important, otherwise objectionable current-peaks, sparking at commutator and excessive wear on brakes are apt to occur.
- 2 Automatic time-limit acceleration on the kick-off on last point lowering. Insures fast kick-off, instantaneous release of brakes and freedom from excessive current-peaks.
- 3 Independent adjustment of acceleration in hoisting and deceleration in lowering. Important because it assures proper hoisting and lowering conditions and makes for greater ease and accuracy in spotting, less inching.
- 4 More accurate speed-control, regardless of load, either on hoisting or lowering—because of better spacing of speed-points, also because of low minimum speed which makes for more accurate spotting without need of so much inching.
- 5 High-speed lowering, providing loaded-hook speed 175% of full-load hoisting speed, light-hook lowering speed from 135% to 170% of full-load hoisting speed—or higher if desired.
- 6 Time-limit acceleration and deceleration are not dependent upon relays or delicate moving parts, assuring dependable action always with less trouble, delay, repairs and expense.

Strength . . . for the "weak spots" of crane-hoist operation

FOR every "liability" and weakness encountered in crane-hoist operation, the Cutler-Hammer Ltd Dynamic Lowering Control provides a safeguard and a strength . . . in the kickoff, and freeing of the brake . . . in the deceleration and stop . . . against the current-peaks which might otherwise result in sparking at the commutator, or a runaway load.

The C-H Dynamic Lowering Control provides automatic operation on all movements of the hook. There is automatic time-limit acceleration for kick-off on last point lowering; and automatic time-limit deceleration on checking, graduated dynamic braking. These provisions make the work easier for the operator, easier on equipment and motors, keep down excessive current-peaks, save the brakes.

An additional factor of safety is provided by the automatic time-limit deceleration. Load is always under complete control. Should brake fail to take hold properly, operator can easily plug his motor without risk of excessive current peaks which might trip the overload

relay and thus throw load entirely out of control.

Adjustment of hoisting-acceleration is independent of adjustment for lowering deceleration . . . a necessity in view of the totally different conditions encountered.

Response to the master is instantaneous. The brake releases at once—(it always has on C-H Control)—even if master is thrown immediately to last point lowering. A wide range of speeds is provided; the minimum speed makes spotting easy without the need of so much inching; the maximum light-hook lowering speed is the highest consistent with safety.

Investigate the C-H Dynamic Lowering Controller thoroughly. This system provides the advantages of other systems plus superiorities no other can show. Details sent upon request.

CUTLER-HAMMER, Inc.

Pioneer Manufacturers of Electric Control Apparatus

1260 St. Paul Avenue

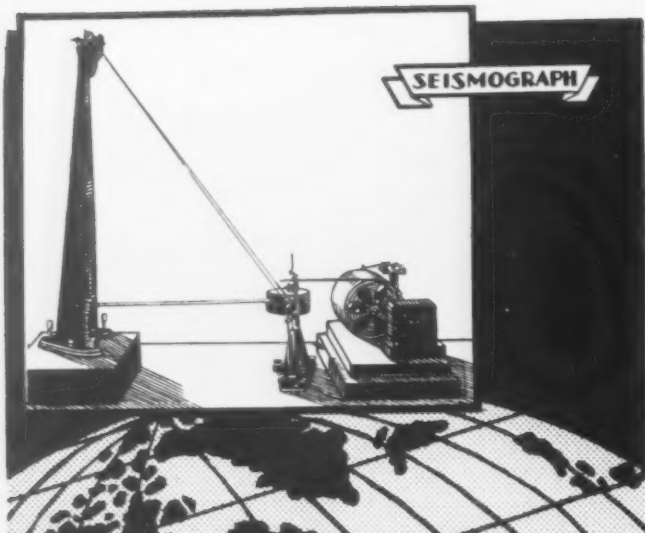
MILWAUKEE, WISCONSIN

CUTLER HAMMER



The Control Equipment Good Electric Motors Deserve

A-243

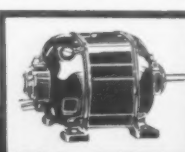


SEISMOGRAPH

Attainment

SEISMOGRAPH—Here is modern attainment at one of its higher levels—the ability of man, aided by a little device, to detect the slightest quiverings of old Mother Earth, thousands of miles away, far below the surface. Then, we have the modern wireless daily picking "wave lengths" out of the air at a distance half the span of the globe from their source. That's progress. Add to these the measure of attainment necessary to create and perfect an electric motor, and you have a trio worthy of any man's wonderment and respect.

THE LELAND ELECTRIC CO.
DAYTON • OHIO
U • S • A.



Leland Motors

$\frac{1}{8}$ $\frac{1}{6}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{2}$ $\frac{3}{4}$ 1 1 $\frac{1}{2}$ 2 3



MOLOCH POWER HAMMERS

A Moloch Hammer in your shop will be an asset as long as the shop lasts. Guaranteed to give satisfaction, these hammers are real investments in service.

Belt or Motor Drive, made in sizes from 25 lbs. to 500 lbs.

MOLOCH FOUNDRY & MACHINE CO.
Kaukauna, Wis.

CHAMBERSBURG-NATIONAL

COMPLETE FORGING EQUIPMENT

CHAMBERSBURG
ENGINEERING CO.
CHAMBERSBURG, PA.

THE NATIONAL
MACHINERY CO.
TIFFIN, OHIO

Sales Offices

NEW YORK, 152 W. 42nd St.

CHICAGO, 565 W. Washington St.

DETROIT, 2457 Woodward Ave.



NAZEL AIR HAMMERS AND DILL SLOTTERS



Nazel Engineering & Machine Works
4045 N. 5th St., Philadelphia, Pa.



Barbour-
Stockwell Co.
Cambridge,
Mass.



Chicago Bridge & Iron Works

Chicago 2148 Old Colony Bldg.
Birmingham 1528 Fifth St., N.
New York 3149 Hudson Terminal
Dallas 3348 Magnolia Bldg.
Cleveland 2238 Midland Bank Bldg.
Atlanta 2148 Rhodes-Haverly Bldg.
Detroit 1528 Lafayette Bldg.
Boston 1513 Consoil. Gas Bldg.
Philadelphia 1627 Jefferson Bldg.
San Francisco 1049 Rialto Bldg.

PRODUCTS

Penstocks
Gas Holders
Steel Pipe
Surge Tanks
Wiggins Tanks
Storage Tanks
Elevated Tanks
Railroad Tanks
Steel Plate
Work

PICKLING TANKS FOR STEEL PLANTS

Storage, galvanizing, pickling and other WOOD TANKS, 4" to 8" in thickness, any length, acid resisting rods when specified.

G. Woolford
Wood Tank Mfg. Co.
P. O. PASCHALL,
PHILADELPHIA, PA.
FACTORY: DARTY, PA.



SINCE
1854



STEEL STORAGE FOR LIQUIDS

The storing of water or valuable liquids is a problem capably solved by Caldwell Heavy Steel Tanks. We build them in all sizes and thicknesses of metal for any requirement. Shipped knocked down with complete plans and materials for assembly or erected if you prefer.

Send for Catalog
W. E. Caldwell Co.
Incorporated

1940 Brook St., Louisville, Ky.

Caldwell
TANKS
AND
TOWERS



MUSKEGON BOILER WORKS

EST.  1865

MUSKEGON MICHIGAN

FABRICATED
PLATE & PIPE WORK
for every INDUSTRY

BOILERS TANKS
HIGH PRESSURE VESSELS
for any PROCESS

WOODEN TANKS

SINCE 1869



The
HAUSER-STANDER TANK CO.
Cincinnati, Ohio U.S.A.

Our Slogan - "We Win With Quality"
Our Policy - "Satisfied Customers Only"

KELLOGG

FORGE AND HAMMER LAP WELDED
BOILER DRUMS...HEADERS
RECEIVERS...SEPARATORS
COMPLETE POWER PLANT PIPING

THE M. W. KELLOGG CO.
225 BROADWAY, N. Y. C.

Birmingham Boston Chicago
Los Angeles Pittsburgh Tulsa

ALL KELLOGG FORGE AND HAMMER
LAP WELDED PRODUCTS ARE INSURABLE

LEAD LINED TANKS

Wood or Steel

For Pickling or Storage of Acids.
Sheet Lead Work and Chemical Lead Burning of every description.
Homogeneous Lead Coatings (Gross Formula) for equipment using
High Temperature, High Pressure or Vacuum.

GROSS LEAD BURNING & COATING CORP.
3959 West 25th St. Cleveland, Ohio

"JASCO" TANKS

TANKS FOR GASOLINE—OIL—AIR—ETC.
COMPRESSED GAS CYLINDERS

—JOS. A. JANNEY, Jr.—
Successor to
JANNEY-STEINMETZ & CO.
PHILADELPHIA NEW YORK

SCAIFE COPPER-BRAZED TANKS

for Air, Gas and Liquids

Welded Tanks Riveted Tanks Rivet Weld Tanks




FOUNDED 1802
WM. B. SCAIFE & SONS CO.
PITTSBURGH, PA.

A.S.M.E. Tanks I.C.C. Tanks

WATER SOFTENERS and FILTERS
(128 years old—Founded 1802)

WM. B. SCAIFE & SONS CO.
Main Office, OAKMONT, PA.
Pittsburgh New York Chicago



ANNEALING BOXES, STACKS,
ELEVATED TANKS, TANK
CARS AND WELDED BOXES,
BINS OR KETTLES—GEN-
ERAL STEEL PLATE CON-
STRUCTION.

THE PETROLEUM IRON WORKS COMPANY
Sharon, Pa.
Plants—Sharon, Pa.
Branch Offices—New York, Chicago, Tulsa



TANKS and STEEL PLATE CONSTRUCTION

370 Lexington Ave. Land Title Bldg.
New York City Philadelphia

LANCASTER IRON WORKS
INCORPORATED
LANCASTER, PA.

AIRTIGHT STEEL TANK COMPANY
PITTSBURGH, PENNA.



TANKS FOR: High pressure gas and air storage—Pneumatic water systems—Gasoline and oil storage—Oil burning equipment—Open top—Welded. ASTCO Genuine Copper Brazed Tanks for high pressure—the tightest, safest, strongest tank it is possible to construct by any known process.—ASME code tanks.



A New Plant Quickly?

100,000 sq. ft. in 60 working days.

Permanent, high grade construction.

Designed and built by Austin

THE AUSTIN COMPANY • **Cleveland**

Design and Construction

Branch Offices from Coast to Coast



COLE TANKS

STAND PIPES --- PLATE WORK
ELEVATED TANKS
BOILERS --- STACKS

R. D. COLE MFG. COMPANY
NEWNAN EST. 1854 GA.
NEW YORK OFFICE: 5 BECKMAN STREET

ARTHUR L. STEVENS CORPORATION

Engineers

205 WEST WACKER DRIVE, CHICAGO, ILLINOIS

*Open Hearth Furnaces, Soaking Pits.
Continuous and Regenerative Heating Furnaces.*

**HEAVY STEEL PLATE
FABRICATION
OF EVERY DESCRIPTION**

LET US QUOTE ON YOUR STANDARD OR SPECIAL WORK
TRAYLOR ENGINEERING & MANUFACTURING CO.
ALLENTOWN, PENNSYLVANIA

Duff Patents Co., Inc.

321 Union Trust Bldg., Pittsburgh, Pa.

Mechanical and Hand-poked Gas Producers, Steel Stacks, Tanks, Rotary Dryers, Calciners, Steel Riveted Pipe and Steel Plate Construction.

THE MEEHAN BOILER & CONSTRUCTION CO.

STEEL PLATE WORKS

Fabricators and erectors of self-supporting Steel Stacks, Breechings, Piping, Tanks, Chutes, Bins, etc., riveted or welded, for Blast Furnaces, Steel and Power Plants and other Industries.

LOWELLVILLE, OHIO

JULIAN KENNEDY

ENGINEER

PITTSBURGH

PA., U. S. A.

Cable Address, ENGINEER, Pittsburgh

**SHOEMAKER
BRIDGE
CO.**

*Bridges and
Buildings*

NEW YORK

POTTSTOWN

PHILADELPHIA

THOS. J. LLEWELYN & Co.
INDUSTRIAL ENGINEERS

911 OLIVER BUILDING PITTSBURGH, PA.

ROLLING MILLS and PIPE MILLS
for Iron, Steel, Copper, and Brass

LIQUIDATIONS • REPORTS • APPRAISALS

McClintic-Marshall Company

Steel Bridges and Buildings

Tanks, Barges, Pipe, Transmission Towers

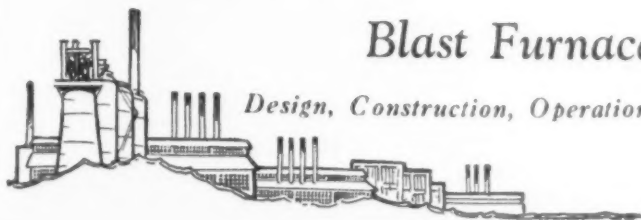
and Plate Work

General Offices:- PITTSBURGH, PA.

OFFICES IN PRINCIPAL CITIES

ARTHUR G. MCKEE & COMPANY

ENGINEERS CONTRACTORS



Blast Furnaces and Steel Plants

Design, Construction, Operation, Management, Appraisals, Investigations

2422 Euclid Ave., Cleveland, Ohio

London Office, Bush House, Aldwych, W. C. 2

H. A. BRASSERT & Co.

Consulting Engineers

Blast Furnace, Steel Plant and Rolling
Mill Design and Construction

Operation and Management
Financial and Technical Reports
Appraisals

CHICAGO
310 S. Michigan Ave.

Brookhouse-Walbrook
LONDON
E. C. 4



BLISS & LAUGHLIN, Inc.

COLD DRAWN STEELS and SHAFTHING

Rounds—Squares—Hexagons—Flats

BLISS & LAUGHLIN, Inc.

Western Mill and General Offices: Harvey, Ill.

Chicago Warehouse: 1023-1027 W. Jackson Blvd.

Eastern Mill: Buffalo, N. Y.

Offices in Principal Cities

PERIN & MARSHALL

CONSULTING ENGINEERS

Investigations, Reports, Development of Raw Materials,
Ore Sintering, Coke Ovens, Blast Furnaces, Open
Hearth and Electric Steel Plants, Rolling Mills, Power
Plants, Cement Plants

11 WEST FORTY-SECOND ST., NEW YORK
Cable Address PERINMARSH

"FROM MINE TO MARKET"

Rods
Wire
Billets
Slabs
Nails



Sheets
To Meet
Every
Manufacturing
Requirement

Reg. U. S. Pat. Office

WHEELING STEEL CORPORATION, Wheeling, W. Va.



STEEL

(CUSTOM MADE)

is produced to meet the exacting
requirements of those who need
Steel of special analysis.

THE ANDREWS STEEL CO., Newport, Ky.

BELMONT IRON WORKS

PHILADELPHIA NEW YORK EDDYSTONE

Engineers — Contractors — Exporters

STRUCTURAL STEEL

Complete Industrial Buildings



MANGANESE STEEL

ROLLED and FORGED PRODUCTS
BAR SHAPES WIRE PLATES SHEETS FORGINGS
"ROL-MAN" DOUBLE LOCK MESH SCREENS
MANGANESE STEEL FORGE COMPANY

Richmond St. and Erie Ave., Philadelphia, Pa., U. S. A.

Pennsylvania Engineering Works

New Castle, Pa.

Engineers and Contractors

Builders of

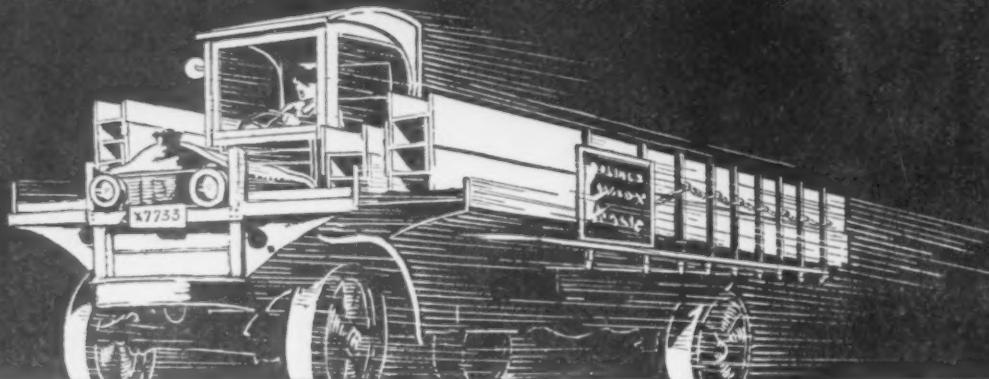
Blast Furnace and Steel Mill Equipment
Heavy Plate Work and Machinery

STAINLESS STEEL

ALSO

HIGH SPEED and CARBON TOOL STEELS
LATROBE ELECTRIC STEEL CO. LATROBE, PA.

Fast Steel Service



Complete stocks carefully maintained Prompt shipment Three strategically located warehouses
For fast steel service, write, telegraph or telephone your instructions

ILLINOIS STEEL WAREHOUSE CO.

Subsidiary of United States Steel Corporation

St. Louis Chicago St. Paul

HOT ROLLED STEEL

Electric and Open Hearth

Tool—Alloy—Carbon
 Bars, Special Shapes
 High Carbon Wire Rods

Driver-Harris Company
 Harrison, N. J.

STRUCTURAL STEEL SHAPES

ANGLES — BEAMS — CHANNELS

STEEL BARS

ROLLED STEEL TIE PLATES

RAILROAD TRACK SPIKES

STEEL CASTINGS

SCULLIN STEEL CO.
 ST. LOUIS

Rolling
 Mills

Steel
 Foundry

INGOT-MOULDS

Direct or Cupola Metal—All Shapes and Sizes

VALLEY MOULD AND IRON CORPORATION

Western Offices:
 100 St. and Calumet River
 South Chicago, Ill.

Main Office—Hubbard, Ohio

Plants:
 Hubbard, Ohio
 Sharpsville, Pa.
 South Chicago, Ill.

"The Largest Manufacturers of Ingot Moulds in the World"

Another Glorious Tower Salutes the Southern Sky

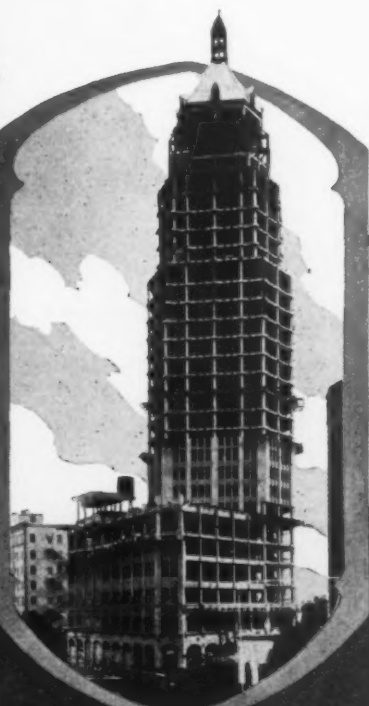
THIS thirty-one-story addition to the sky-line of San Antonio exemplifies to a marked degree the modern trend in architecture. Beauty of line and detail, refinement of finish, efficiency in lay-out and operation have been attained through artistic and practical conception and faithful execution.

The necessarily inherent qualities . . . strength, safety, durability, fire-resistance . . . have been built in through the use of TENNESSEE STRUCTURAL STEEL.



SMITH-YOUNG TOWER

Atlee B. & Robt. M. Ayres, Architects.
McKenzie Construction Co., General Contractors.
Virginia Bridge & Iron Co., Fabricators and Erectors of the Steel Work.



Tennessee Coal, Iron & Railroad Company

General Offices: Brown-Marx Building, BIRMINGHAM, ALA.

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES OF UNITED STATES STEEL CORPORATION:

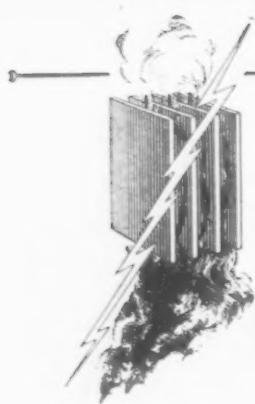
AMERICAN BRIDGE COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY
AMERICAN STEEL AND WIRE COMPANY

CARNEGIE STEEL COMPANY
CYCLONE FENCE COMPANY
FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

ILLINOIS STEEL COMPANY
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY

THE LORAIN STEEL COMPANY
TENNESSEE COAL, IRON & R. R. COMPANY
UNIVERSAL ATLAS CEMENT COMPANY

Pacific Coast Distributors—United States Steel Products Co., Columbia Department: San Francisco, Los Angeles, Portland, Seattle, Honolulu. Export Distributors—United States Steel Products Co., New York City



COTTRELL

ELECTRICAL PRECIPITATION PROCESSES

for the removal of

DUSTS, FUMES, MISTS, TARS

and OTHER SUSPENDED MATTER from GASES

The following applications of the Cottrell Processes are established by satisfactory performance and the removals effected being only dependent on the Purchasers' requirements.

By-Product Coke Oven Gas	95%—99% removal
Powdered Coal Ash	90%—95% "
Hot Roaster Gas	95%—99% "
Sulphuric Acid Mist	95%—99% "
Contact Acid Gas Purification	99% "
Phosphoric Acid Recovery	95%—99% "
Carburetted Water Gas	95%—99% "
Carbon and Lamp Black	95%—99% "
Miscellaneous Applications	90%—99% "

Our experience gained through the construction and successful operation of Cottrell Electrical Precipitation Process Installations of a total gas capacity exceeding 10,000,000 cubic feet per minute treating different types of gases enables us to intelligently study any new problem in gas cleaning. If our Process can be adapted, we are prepared to offer a complete installation guaranteed to effect the desired result.

Gas Detarring
Blast Furnace Gas Cleaning
Powdered Fuel Ash Removal
Carbon and Lamp Black Recovery
Asphalt Products Recovery
Non-Ferrous Metal Treatments

RESEARCH CORPORATION

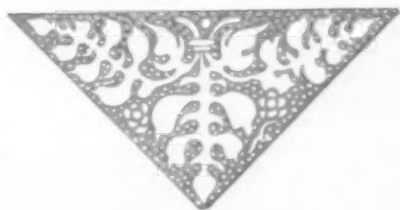
**405 Lexington Avenue
NEW YORK, N. Y.**

Chicago Office, 343 S. Dearborn Street
Plant and Laboratory, Bound Brook, N. J.

Air Cleaning
Food Products Recovery
Paper & Pulp Mill Processes
Sulphuric Acid Recovery
Roaster Gas Cleaning
Miscellaneous Acid Recovery



*In every detail of its
production and service, this
organization's leadership in
the cold finished steel industry
is being constantly reflected*



UNION DRAWN STEEL CO.

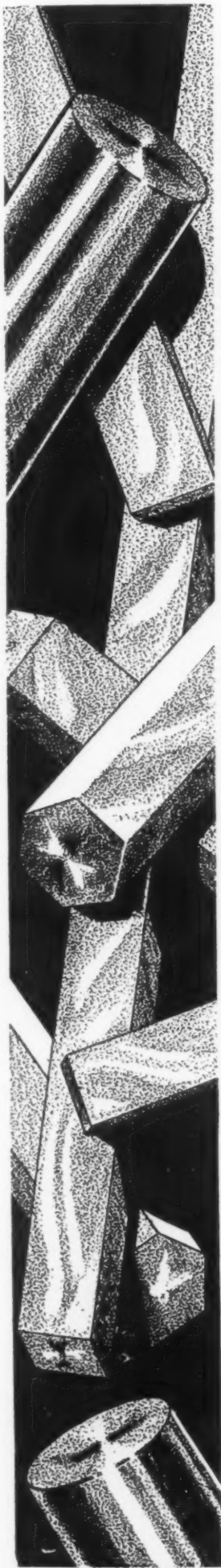
This is Number Seven of a Series of Advertisements

**THE COLD FINISHED STEEL BAR
INDUSTRY HAS ESTABLISHED
A NEW STANDARD OF
RESPONSIBILITY**

The COLD FINISHED STEEL BAR, manufactured and distributed at only a small price differential, is sold under published specifications and standards exacting to the extreme. Slivers, seams, guide marks, pipes, mixed steel—are practically unknown in COLD FINISHED STEEL BARS. Many such defects cannot be discovered until after they are cold finished. Present, in a shipment to you, they would represent a loss—a loss which the Cold Finished Steel Bar Industry must and does bear, *that you may receive material of the most exacting quality backed by a responsibility that does not quibble or compromise.*

"The Rapid Duplication of Machined Steel Parts at Lowest Cost Continues to Depend Upon That Perfection and Precision Which Only the Cold Finishing Processes Can Give"

**THE COLD FINISHED
STEEL BAR INDUSTRY**



"DARWIN"
QUALITY
The ultimate in the evolution of
TOOL STEELS
 Non-Deforming, Oil-Hardening "NEOR"
 Air-Hardening—Patent Cobaltchrom "PRK-33"
 which can also be used in the form of
CASTINGS
DARWIN & MILNER, INC.
 1260 West 4th Street, CLEVELAND, OHIO

TOOL STEELS
 CARBON AND OIL HARDENING
 FJAB-AMCOH Rolled Hollow Die Steel
A. MILNE & CO. 741-5 Washington Street, New York
 8 Oliver Street, Boston
 17-19-21 North May St., Chicago

Pittsburgh Forge & Iron Company
 PITTSBURGH, PA.
 Bar Iron, Engine-Bolt Iron, Staybolt Iron, Gear Blanks, Heavy Forgings, Car and Locomotive Axles, Rolled, Hammered or Hydraulically Forged. Specialty—High Class Neutral Iron for Forging Purposes.

HIGH GRADE COLD DRAWN STEELS
 Rounds, Squares, Flats, Shapes
DRILL RODS
Assured quality and service
Pittsburgh Tool Steel Wire Company
 Monaca, Pa.

DRILL RODS
 GLOBE POLISHED - BLUE CHIP HIGH SPEED
 QUALITY - ACCURACY - UNIFORMITY
GLOBE WIRE COMPANY
 SHARPSBURG, PA.


Pure Iron—Copper Alloy
Rust-Resisting Sheets
 For all exposed surfaces, where a rust resisting material is required. Possesses excellent working and forming qualities. Furnished in Black and Galvanized Sheets and Formed Products.
 "GALVANIZED SHEETS PROTECT"
THE NEWPORT ROLLING MILL CO., Newport, Ky.

WEIRTON STEEL COMPANY

Division of NATIONAL STEEL CORPORATION

Manufacturers of High Grade Products

ROOFING TERNES

Copper Bearing 8 lb. to 40 lb. Coated.
 Terne Roll Roofing

GALVANIZED SHEETS

Flat and Corrugated
 Commercial and Tight Coated

COKE TIN PLATE


Open Hearth Quality
 Kannern Special
 Best Cokes
 Prime 1-A Charcoals

OTHER PRODUCTS

Black Sheets, Blue Annealed, Hot and Cold Rolled Strip Steel, Single Pickled, Full Finished and Auto Body Sheets, Billets, Slabs, Sheet Bars, Skelp, Tin Mill Black Plate.

General **WEIRTON, W. VA.** Offices

Sales Offices in All Principal Cities


SHEETS
for difficult stampings
THE EASTERN ROLLING MILL CO.
 BALTIMORE, MD.

SENECA Full Finished Sheets
 for FURNITURE BODIES, COWLS, HOODS,
 AUTOMOBILE DOORS, APRONS, RADIATORS
 also ENAMELING & JAPANING SHEETS
 BLACK SHEETS.
SENECA IRON & STEEL CO., Buffalo, N. Y.

NEWSTEEL SHEETS
 FOR ALL METAL WORKING PURPOSES

THE NEWTON STEEL CO.
 YOUNGSTOWN, OHIO

FIRTH-STERLING **STAINLESS AND TOOL STEELS**
FIRTH-STERLING STEEL COMPANY · M'KEESPORT · PA.
 WORKS: NEW YORK · DETROIT
 M'KEESPORT, PA. BOSTON · CLEVELAND
 GLOBE WIRE DIVISION PHILADELPHIA · CHICAGO
 SHARPSBURG, PA. HARTFORD · LOS ANGELES

ACME



Hot and Cold Rolled Strip
Electro Galvanized Strip

....

Long Length Coils
or Cut-to-Length

1880 ACME STEEL COMPANY **1930**
OUR GOLDEN ANNIVERSARY

General Offices: 2840 Archer Avenue ... Chicago
BROOKLYN DETROIT MILWAUKEE SAN FRANCISCO



STEEL



SAVE WITH STEEL

Hot and Cold Rolled Strip Steel

For All Purposes $\frac{3}{4}$ to 24 Inches Wide

QUALITY and SERVICE

WEST LEECHBURG STEEL COMPANY

General Offices: Farmers Bank Building, Pittsburgh, Pa.

NEW YORK—50 Church St.
NEW ENGLAND—236 N. Quaker Lane, West
Hartford, Conn.
PHILADELPHIA—Edgecomb Steel Co., D Street
below Erie Ave.
CHICAGO—1153 Peoples Gas Bldg.

NEWARK—Edgecomb Steel Corp., 350 Freling-
huysen Ave.
DETROIT—5-255 General Motors Bldg.
TOLEDO—Dean Higgins & Co., 906 Ohio Bldg.
CINCINNATI—1707 Union Central Bldg.
ST. LOUIS—1413 Chemical Building.

WAREHOUSE STOCKS of Cold Rolled Strip Steel are carried by

EDGCOMB STEEL CO., Philadelphia

EDGCOMB STEEL CORP., Newark

JOS. T. RYERSON & SON, Chicago

GRIFFIN

Cold Rolled Strip



Desired Quality for Forming and Drawing

Uniform quality in widths from $\frac{1}{8}$ " to 19"; and gauges from .002" to .500"; special tempers for forming and high class stamping work.

GRIFFIN MFG. CO.

ERIE, PENNA.

DISTRICT SALES REPRESENTATIVES:

New York—Warehouse
Wm. H. Leonori & Co., Inc.
301 Howard Street.
Philadelphia—Warehouse
Wm. H. Leonori & Co., Inc.
The Morgan Steel Co.,
1230 Callowhill Street.
Chicago—Warehouse
Central Steel & Wire Co.
4545 S. Western Blvd., Chicago
Bellevue & Warren Aves., Detroit.

Boston—Warehouse
H. D. Evans Steel Co.,
127 Oliver Street.
Buffalo—Sales Office
N. D. Tilbury
307 White Bldg.
Cleveland—Sales Office
The Paterson-Leitch Co.
900 East 69th Street.
Dayton—Warehouse
Central Steel & Wire Co.
1095 E. Monument Avenue.
Detroit—Sales Office
J. B. Tramer
801 Ford Bldg.
San Francisco—Sales Office
Charles L. Lewis
703 Market Street
Canada—Warehouse
Peckover's Limited
77 Front Street, East,
Toronto 2, Ontario.



"SAVE WITH STEEL"

SUPERIOR STEEL CORP.

Hot and Cold Rolled Strip Steel

ALSO MANUFACTURERS OF

Rust Resisting Metals highly resistant to
rust and corrosion, produced from the product
of the Rustless Iron Corporation of America.

GRANT BUILDING . . . PITTSBURGH, PA.

PRECISION COLD ROLLED STRIP STEEL

SHIM STEEL .0015 AND HEAVIER

Up to sixteen inch widths in light gauges

THE COLD METAL PROCESS COMPANY

Youngstown, Ohio

HIGH GRADE STRIP STEEL

STAMPING AND DEEP DRAWING
UNIFORM IN QUALITY

Control of the Quality begins with the manu-
facture of the steel in our own Open Hearth
and continues through all subsequent
Processes

LACLEDE STEEL CO.

ST. LOUIS

Steel Works & Rolling Mills, Alton, Ill.

OFFICES: Detroit—Chicago—St. Louis—Kansas City



TAYLOR SPIRAL RIVETED PIPE

REDUCES TRANSPORTATION DIFFICULTIES . . .
SAVES TIME AND LABOR IN INSTALLATION . . .
PERMITS READY CHANGE OF LOCATION. LIGHT
IN WEIGHT, STRONG, AND DURABLE. MADE OF
COPPER ALLOY STEEL. COATED INSIDE AND
OUT WITH ZINC OR ASPHALT (HOT DIP METH-
OD). SIZES 3" TO 42" DIAMETER.

Send for Spiral Pipe Catalog

TAYLOR FORGE & PIPE WORKS, CHICAGO

BOX 485, CHICAGO, ILL.

50 CHURCH ST., NEW YORK, N. Y.



AN ABSOLUTELY TIGHT DURABLE PIPE
The lap riveted seam repeats its cycle every twelve inches, forming a broad
stiffening rib of great value, and makes Root Pipe one-third stronger than any
other type of pipe construction. Light weight and simple connections reduce
transportation, handling and erection costs. Suitable for conveying water, air,
gas, exhaust steam and powdered coal.
ABENDROTH & ROOT MANUFACTURING COMPANY
Pipe Specialists Continuously Since 1867. Sales Office: Woolworth Bldg., N. Y.

SEAMLESS & WELDED STEEL TUBING BOILER TUBES

NEW YORK AND PITTSBURGH WAREHOUSE STOCKS
AND PROMPT MILL SHIPMENTS

THE H. L. WANDERMAN CO.

1440 BROADWAY

NEW YORK CITY



The basis of dependable **PIPING SYSTEMS**

*—standardize on
one make of
reliable pipe*

THERE is a growing recognition by industrial executives and engineers of the basic advantages in standardizing on *one* pipe.

Whether for water, oil, gas or air—dependability can best be maintained by selecting the *right* pipe and then using that pipe *throughout* the system.

NATIONAL is the right pipe—it is reliable under any conditions of service. In thousands of industrial installations over decades of time, it has continually and consistently proved dependable through the entire gamut of service hardships.

For new installations, extensions or replacements—you can *depend* on NATIONAL'S strength, uniformity and ductility; clean, smooth surfaces and resistance to corrosion. These qualities—inherent in every length—resist stresses; aid manipulation when bending is desired; promote smooth performance; insure durability and defer replacements.

No matter how ordinary or how special the service may be—it will pay you to standardize on NATIONAL for all purposes—

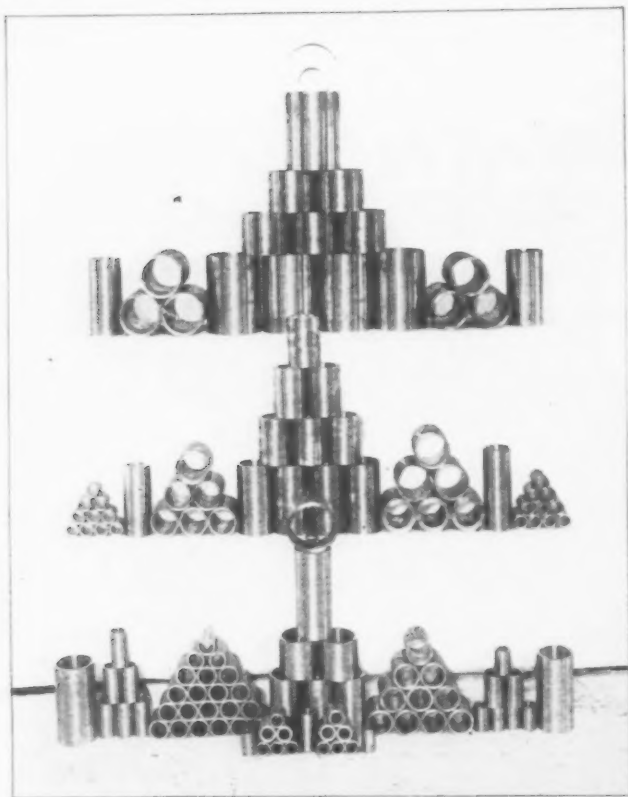
America's Standard Wrought Pipe

NATIONAL TUBE COMPANY

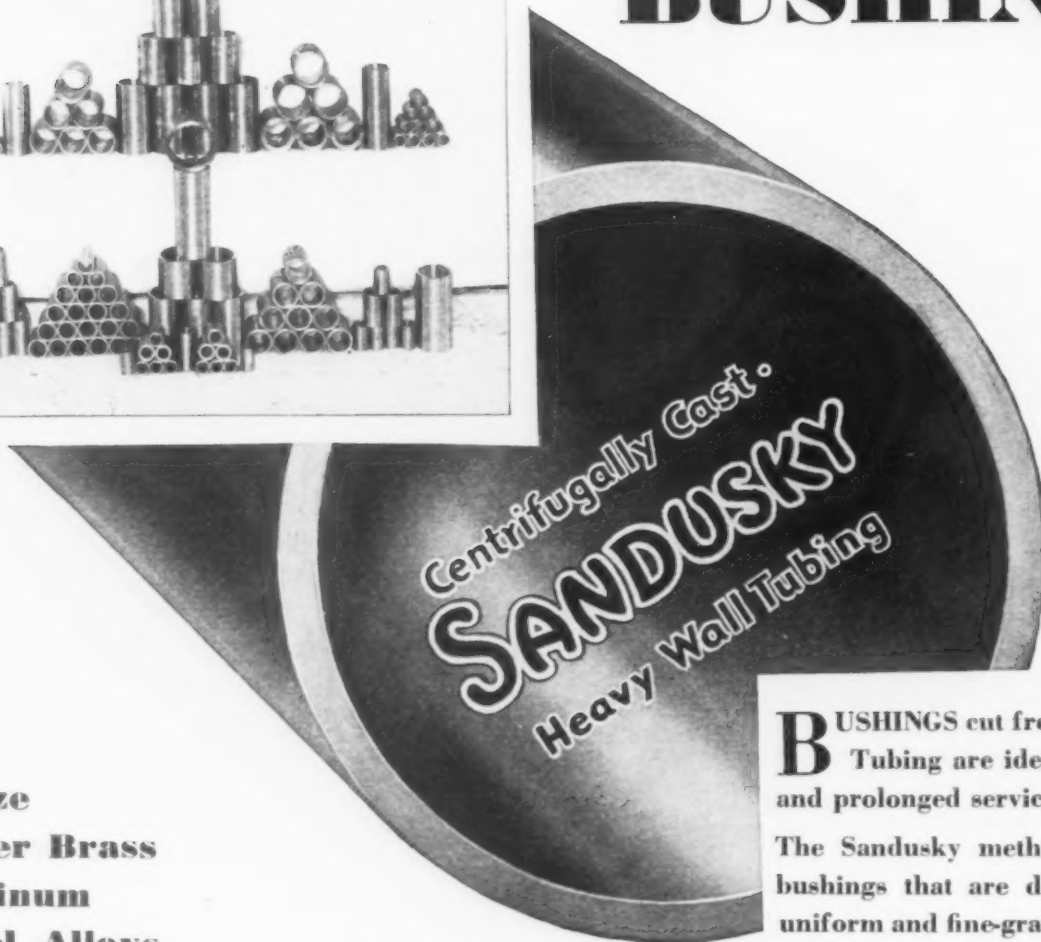
Subsidiary of United States Steel Corporation

PITTSBURGH, PA.

NATIONAL PIPE



BETTER BRONZE BUSHINGS



Centrifugally Cast
SANDUSKY
Heavy Wall Tubing

Bronze
Copper Brass
Aluminum
Nickel Alloys
Diameters from 4" to 46"
Lengths to 330"

BUSHINGS cut from Sandusky Tubing are ideal for severe and prolonged service.

The Sandusky method produces bushings that are dense, sound, uniform and fine-grained. Closely controlled processes insure a truly superior product.

The manufacturing economies are evident. Bushings are furnished as a tube, or cut to size—either semi-finished or machined to exact dimensions.

Sandusky Bushings pay for themselves through savings in maintenance costs. Estimates gladly furnished on any quantity.

The **Paper & Textile**
Sandusky Ohio. Machinery Co.

SANDUSKY

SINCE 1910
PIONEERS IN THE ART OF
CENTRIFUGALLY CASTING
HEAVY TUBES.



QUALITY TUBING

COLD DRAWN SEAMLESS TUBING
MADE BY THE PILGER OR FORGING PROCESS

IT IS AN ACCEPTED FACT THAT
FORGED STEEL IS SUPERIOR TO ROLLED STEEL

SEAMLESS STEEL TUBING IN
REGULAR CARBON STEELS

SMOOTH FINISH TUBING
WORKING BARREL OR GUN BARREL FINISH

Allegheny Metal and Ascoloy Tubing

Corrosion, chemical, heat and Abrasion resisting

THE DELAWARE SEAMLESS TUBE CO.
(Subsidiary of the Allegheny Steel Co.)

Auburn, Pennsylvania



Tubing by Summerill

Seamless Tubing of
Steel, Brass,
Copper Aluminum
Nickel-Silver

Specialists in
Precision and
Hypodermic Needle
Tubing

Manufacturers and Ware-
housers, Aircraft Steels,
also Commercial Steel.

Summerill Tubing
Company

Bridgeport, Montg. Co., Pa.
(Phila. District)

TUBING

STEEL
BRASS
COPPER

Over 1,000,000 feet in stock available for immediate shipment

SERVICE STEEL CO.

19 Scott Street
BUFFALO
32 E. Front St.
CINCINNATI

Stock List
sent on application
1435 Franklin St.
DETROIT

216 N. Alameda St.
LOS ANGELES
1106 Post St.
SEATTLE

TUBING

SEAMLESS STEEL—COLD DRAWN—HOT FINISHED
WELDED—BRASS AND COPPER—ALLOYS

Stock and mill shipment

THE CLEVELAND TOOL AND SUPPLY COMPANY
1427-1437 West 6th Street Cleveland, Ohio



Water Tube Boilers
Superheaters
Economizers

Waste Heat Boilers
Refractories
Oil Burners

THE
BABCOCK & WILCOX
COMPANY
85 LIBERTY ST. NEW YORK, N. Y.

BOILER TUBES

"TONCAN" Seamless Iron
Seamless Steel—Charcoal Iron—Lapwelded Steel
Marine and Stay Tubes

E. F. KEATING CO.

448-454 Water St. New York City
Complete Warehouse Stocks

TYLER

for **DEPENDABLE QUALITY**
... PLUS IMMEDIATE SHIPMENT

Regardless of your tube needs—you will find us able
to serve you in a dependable and economical man-
ner. Immediate shipment can be made from a ware-
house located in your near vicinity.

Boiler Tubes made of

**COP-R-LOY
ARMCO INGOT IRON
O. H. STEEL**

Today—write us about your standard
or special requirements.

THE TYLER TUBE & PIPE CO.
Washington, Pa.

Warehouse Stock
Boiler Tube Co. of America, Pittsburgh, Pa.—Brooklyn,
N. Y.; Avery & Saul Co., Boston, Mass.; Beale, McCarthy
& Rogers, Inc., Buffalo, N. Y.; John McKenzie & Co.,
Baltimore, Md.; Tidewater Supply Co., Norfolk, Va.—
Columbia, S. C.; Jos. T. Ryerson & Son, Inc., Cincinnati,
Ohio; Lukens Steel Co., New Orleans, La.; Young & Vann
Supply Co., Birmingham, Ala.; McGowan-Lyons Hardware
& Supply Co., Mobile, Ala.; A. M. Castle & Co., Chicago—
Seattle—San Francisco—Los Angeles; Harrisburg Pipe &
Pipe Bending Co. of Texas, Inc., Houston, Texas.

Special Representatives
W. H. MacCleary, New York, N. Y.; W. H. S. Bateman &
Co., Philadelphia, Pa.; Denyven, Linn Co., Boston, Mass.;
Peter A. Bauer, Buffalo, N. Y.; J. R. Edwards, Erie, Pa.;
J. F. Corlett & Co., Cleveland, Ohio; Harrisburg Supply
Co., Tulsa, Okla.

BOILER TUBES

SOLDERING LUGS—

All Styles, Sizes, Quantities

WOLVERINE TUBE CO.

Quick
Delivery
from
Stock

SEAMLESS COPPER, BRASS & ALUMINUM



1425 Central Ave.

Detroit, Mich.

Write
for
Price
list

The Hegeler Zinc Company

DANVILLE, ILLINOIS

Manufacturers of

Rolled Zinc-Strips and Coils

Boiler Plates

Slab Zinc

Sulphuric Acid

ZINC

COLD ROLLED, COILS AND STRIPS
FOR STAMPING AND DRAWING
ZINC STRIP FOR ELECTRIC FUSES

Also Manufacturers of EYELETS

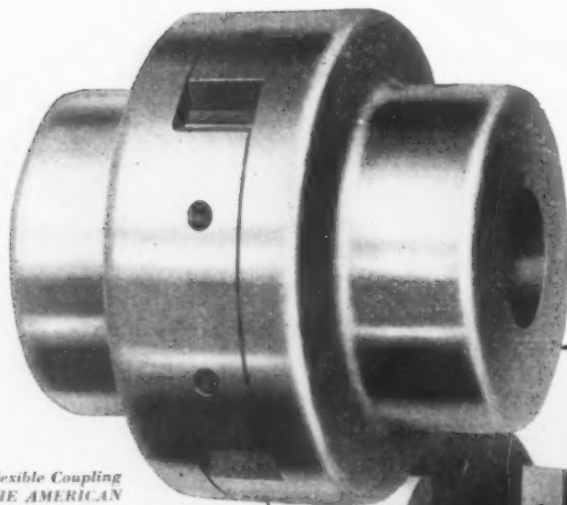
The Platt Bros. & Co., Waterbury, Conn.

J. E. BAKER COMPANY

YORK, PA.

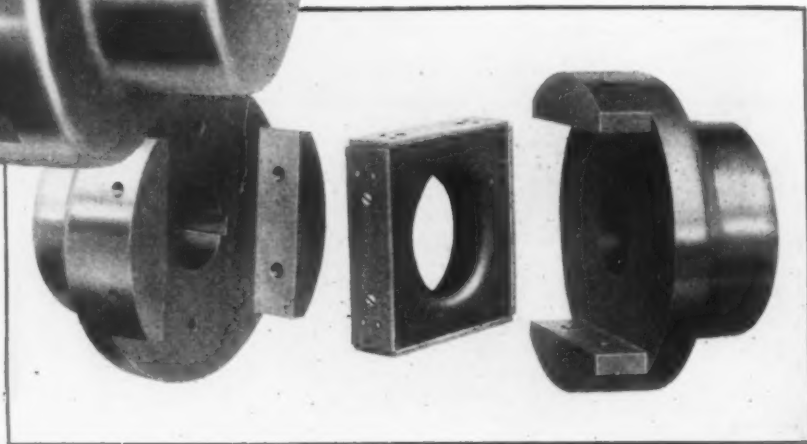
35 Years' Experience

MAGDOLITE—LOW SILICA LIMESTONE
DOLOMITE—WHITING—CHEMICAL LIME



Above: American Flexible Coupling
manufactured by THE AMERICAN
FLEXIBLE COUPLING CO.,
Erie, Pa.

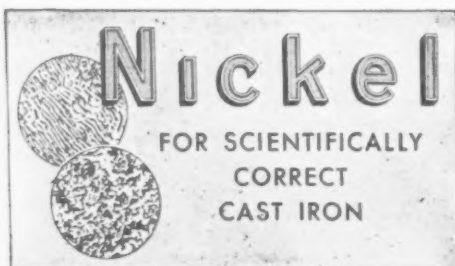
Below: View of parts disassembled
showing Nickel Cast Iron jaw flanges
cast by URICK FOUNDRY CO.,
Erie, Pa.



NICKEL CAST IRON *guarantees service in American Flexible Couplings*



Our casting specialists will gladly discuss your casting problems with you.



TWO identical jaw flanges connected with a full floating square center member of special design is the elementary principle upon which the American Heavy Duty Flexible Coupling is based. This coupling is simple in design, easily installed and guaranteed by a free replacement offer. The manufacturer guarantees the performance of these parts because he knows that the Nickel Cast Iron from which the couplings are produced is a scientifically correct material having superior physical properties. In addition to the improved strength, toughness and wear-resistance which makes such a service guarantee possible, Nickel Cast Iron provides production advantages of uniform density and stabilized machinability.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.



**NICKEL
SILVER**

**PHOSPHOR
BRONZE**

**SHEETS
WIRE
RODS**

**NICKEL
ANODES
CAST or ROLLED**

The SEYMOUR MANUFACTURING CO.
SEYMOUR EST. 1878 CONNECTICUT

**PILLING &
COMPANY**

PHILADELPHIA BOSTON NEW YORK PITTSBURGH *Inc.*

Pig Iron
Iron Ores
Alloys
Coal
Coke

IRON ORE · PIG IRON

TRADE MARK  **COAL COKE**

The Cleveland-Cliffs Iron Co.
CLEVELAND, OHIO.



"A.W." PRODUCTS

- "Swede" Pig Iron
- *"A.W." Billets, Blooms and Slabs
- *"A.W." Sheared Steel Plates
- *"A.W." Blue Annealed Sheets and Light Plates
- *"A.W." Diamond Pattern Floor Plate
- *"A.W." Diamondette Pattern Floor Plate
- *"A.W." Diamond Pattern Traffic Treads
- *Copper-Bearing, Alloy and Carbon Analyses

Write for a copy of the "A.W." Catalog, containing complete data on "A.W." Products.

ALAN WOOD STEEL CO.
Conshohocken, Pa.

Philadelphia
Seattle
New York
San Francisco
Boston
Los Angeles
Dallas

HANNA PIG IRON



You can build and maintain a reputation with Hanna Pig Iron

BRANDS :

Buffalo — Detroit
Susquehanna
Hanna Silvery
Ferro Silicon

GRADES :

Foundry
—strong or soft
Malleable
—all grades of analysis

The HANNA FURNACE CORP.
MERCHANT PIG IRON DIVISION
OF NATIONAL STEEL CORP.
2524 UNION TRUST BLDG. DETROIT, MICH.

PICKANDS MATHER & CO.

CLEVELAND, OHIO

~
**IRON ORE
PIG IRON
COAL
COKE**

Hillman Coal and Coke Co.

1st NATIONAL BANK BLDG.

New York—Whitehall Bldg.

Philadelphia—Pennsylvania Bldg.

PITTSBURGH, PA.

Baltimore—Continental Bldg.

**Low Phosphorus Connellsville
Blast Furnace Coke**

—FOR—

Bessemer & Low Phosphorus Iron

Shipments 3,000,000 Tons Annually

Prompt Shipment

Any Railroad Delivery

(Machine Cast)

CHATEAUGAY PIG IRON

(Copper Free)

—ALL ORE—

GUARANTEED .03 MAXIMUM PHOSPHORUS AND SULPHUR

Silicon as Desired Between .75 and 3.00 Per Cent

E. J. BURNES, General Sales Agent

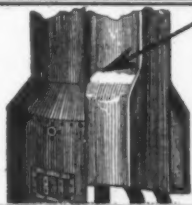
CHATEAUGAY ORE & IRON COMPANY, 26 Liberty Street, New York

ROGERS BROWN & CROCKER BROS., INC.Ferro-Phosphorus
Ferro-Silicon
Spiegeleisen
Fluor Spar

COKE — PIG IRON — FERRO-MANGANESE

21 East 40th St., New York, N. Y.

Cincinnati Buffalo Philadelphia Boston Pittsburgh Cleveland Chicago St. Louis

Aluminum
Nichrome B
Smithing Coal
Molding Sand*Mica Schist Lining
Fuses Into One Piece*MICA SCHIST will appeal to you for two simple reasons.
1. It is a natural refractory, in large blocks which readily fuse together. Expansion is nil. Slag will not adhere to it.
2. Low costs of material, installation and maintenance result in large savings. Shipped in bulk car lots taking the low rate.**EDGE HILL SILICA ROCK CO.**
NEW BRUNSWICK, N. J.

High Temperature Cements

FIREBOND**THERMOLITH**

REFRACTORIES

Fireclay High-Alumina Silica Chrome Magnesite

Acid-Proof Brick

HARBISON-WALKER REFRACTORIES CO.
World's Largest Producer of Refractories Pittsburgh, Pa.*The Howe-Fuller Refractories Co.*

ALL REFRACTORY MATERIAL

Silica, Fire Clay, Chrome, Magnesite Brick
All Grades Fire Clay and Refractory Cements

Offices: 2008 Union Trust Bldg., CLEVELAND, OHIO

If a company in your line has
found a better way of doing a
thing, the probabilities are that
your business paper tells about it.

Frank Samuel

S. A. Cochran

Snowden Samuel

FRANK SAMUEL & CO.

Harrison Bldg., Philadelphia, Pa.

80% FERRO-MANGANESE ENGLISH

ENGLISH LOW PHOS. PIG IRON FRENCH FOUNDRY

MUCK BARS

LOW PHOS. & STAYBOLT

AMERICAN SWEDO IRON CO.'S

MANGANESE ORE

OPEN HEARTH USE

BLAST FURNACE USE

IRON ORES

AFRICAN LUMP

CHROME ORE SAMCO GROUND

Branch Offices:

29 Cortlandt St., New York

24 Alban Rd., Boston, Mass.

Walter-Wallingford & Co.

50% Ferro Silicon

Ferro Manganese

Chrome Ore

Pig Iron

CINCINNATI

20% to 25%

Ferro Phosphorous

Spiegeleisen

Iron Ore

Coke

CHICAGO

NATIONAL FORGE & ORDNANCE CO.

Irvine (Warren Co.), Pa.

Manufacturers of high grade Forgings.
Hollow bored, rough or finished complete.

Bell Phone: 55 Youngsville, Pa.

Branch Offices:

CHICAGO

CLEVELAND

NEW YORK

DETROIT

**CHROME
ORES**

— "LAVINO" —

FERRO-MANGANESE

E. J. LAVINO AND COMPANY

CHICAGO

PHILADELPHIA

**CHROME
BRICK**

PITTSBURGH

FERRO-SILICONFERRO-MANGANESE
SILICO-MANGANESEFERRO-CHROME
SILICO-ALUMINUM

PITTSBURGH METALLURGICAL CO., INC.

PLANT and MAIN OFFICE
NIAGARA FALLS, N.Y.**NIAGARA**
BRAND

UNIFORMITY IN ALL RESPECTS

In size — in texture — in quality — in all respects, General Refractories brick have *always* been noted for their uniformity.

Uniform brick, as originally introduced by General Refractories, make possible thin, regular joints and help materially to increase furnace lining life. Ask for recommendations to meet your individual needs.



GENERAL REFRACTORIES COMPANY

106 South 16th Street, Philadelphia, Pa.

District Offices: Birmingham, Boston, Buffalo, Chicago, Cleveland, Detroit, Indianapolis, New York, Pittsburgh, St. Louis, San Francisco

Representatives: Seattle, Montreal, Havana, Cuba

Chromium


**GIVES STEEL GREATER
PERMANENCY and BEAUTY**

The selection of Alloy Steel containing a high percentage of chromium for the window trim and exterior metal decoration of the new Empire State Building again emphasizes its adequacy for meeting the architectural demand for permanence and beauty.

The element chromium gives to this steel resistance to atmospheric corrosion and the exceptional quality of retaining its color and luster. Further, it assures life-long freedom from maintenance expense. This steel does not tarnish. It is rustless throughout. It is not subject to surface deterioration, peeling, chipping or other change.

It will pay you to make a thorough investigation of the inherent advantages of Alloy Steel. Electromet engineers will be glad to explain how required physical and chemical qualities may be obtained by the proper use of Ferro-Alloys.

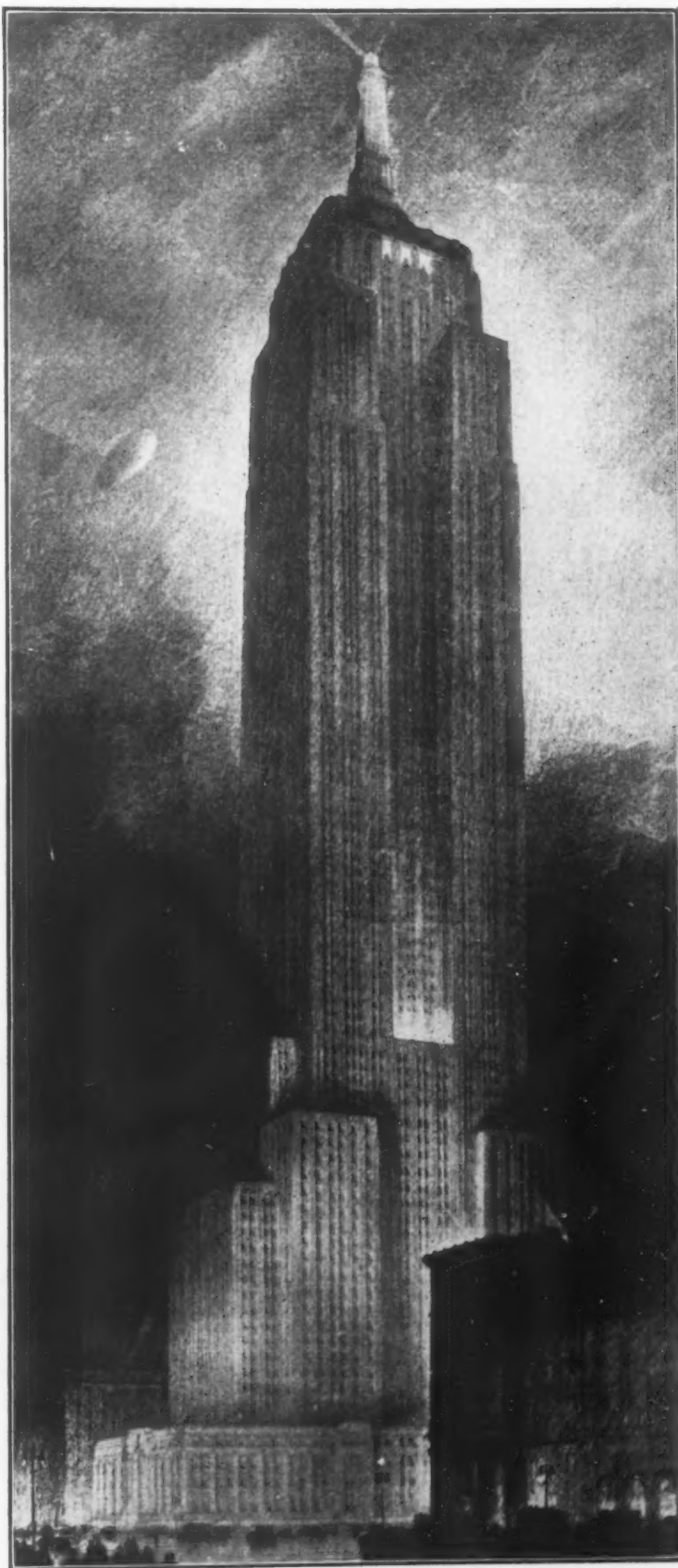
ELECTRO METALLURGICAL SALES CORP.

Unit of Union Carbide  and Carbon Corporation
Carbide and Carbon Building,
30 E. 42nd St., New York, N.Y.

The World's Tallest Structure
EMPIRE STATE BUILDING
New York

Shreve, Lamb & Harmon **Meyer, Strong & Jones**
Architects *Engineers*

Starrett Bros. & Eken, Inc.
Contractors



Electromet

Ferro-Alloys & Metals

**We can
furnish you**

WELDLESS ROLLED STEEL RINGS

of the finest quality



sizes
5 to 160 inches
outside diameter

Edgewater Steel Company~Pittsburgh, Pa.

CANN & SAUL STEEL CO.

Open Hearth and Alloy Steel

FORGINGS

WELDLESS RINGS · GEAR BLANKS · SPINDLES

Smooth Forged or Rough Machined

Special Facilities for
HEAT TREATING

FORGED STEEL PIPE FLANGES

IN THE ROUGH HYDRAULIC VAN STONE FINISH MACHINED
REDUCING **FLANGES** BLIND
SPECIAL RING SARGOL NEW 401350 WELDING SCARF

PLANT
ROYERSFORD, PA.

MAIN OFFICE
PHILADELPHIA, PA.

**MILWAUKEE
WELDLESS RINGS**

Rolled close to finished size,
our rings save you labor and
material costs. Let us know
what you require—we guaran-
tee to more than meet your
requirements.

MILWAUKEE FORGE & MACHINE CO.
340 E. OKLAHOMA AVE. MILWAUKEE, WIS.

FORGINGS

CRANKSHAFTS
CONNECTING RODS
HOLLOW BORED
FORGINGS

BAY CITY FORGE CO.
ERIE, PA.



DROP AND UPSET FORGINGS



There is a certain satisfaction in knowing that the job is being done well—a satisfaction to the consumer and to the producer.

We do know that every forging we produce is as good a job as we know how to do on that type of forging—and we're experts. Yet, there is no good reason why our forgings should be poorly constructed, since we have a fine engineering staff, well-trained workmen and a fine shop. You, too, may experience this satisfaction. Our engineers will show you an economical way.

Forgings, in any steel specification, under 500 pounds. Capacity 2,500 tons monthly.



UNION SWITCH & SIGNAL CO.

DROP FORGE DIVISION

PITTSBURGH DISTRICT SWISSVALE, PA.

DROP-FORGINGS
any shape
any material
any size to 350 lbs

UP-TO-DATE
FACILITIES
LABORATORY
HEAT-TREATING
SAND BLASTING

J. H. WILLIAMS & CO.
"The Drop-Forging People"
BUFFALO
NEW YORK CHICAGO

ATLAS

Drop Forging Engineering and Manufacturing since 1906. A Distinguished Service Record.
All trained and experienced men to handle your work correctly.
Wide range of equipment, Hammers, Upsetters and Hydraulic Machinery. Finest Heat Treating facilities.
Your specifications strictly adhered to. No charge for Engineering Service.

ATLAS DROP FORGE CO., LANSING, MICH.

DROP FORGINGS FROM SMALLEST TO LARGEST
Upset and Machined Forgings
TRUCK, AUTOMOBILE, CAR
AND GENERAL FORGINGS
CANTON FORGE & AXLE COMPANY
2005-2039 DUEBER AVE., S. W., CANTON, OHIO

1864 **DROP FORGINGS** 1930
AUTOMOBILE CARRIAGE SPECIAL

We specialize in forgings of nickel steel, chrome nickel, vanadium tool, open hearth, Bessemer steel and Norway iron. Estimates furnished and deliveries made promptly. We are well equipped to heat-treat and machine forgings.

THE E. D. CLAPP MANUFACTURING CO.
86 Columbus St., Auburn, N. Y.

STEEL FORGINGS

UPSET, DROP and COIN PRESSED
ANY ANALYSIS—ANY QUANTITY

Send us your blue prints for prices

ROCKFORD DROP FORGE CO.
ROCKFORD, ILL.

 **STEEL & IRON FORGINGS** 
 SHAFTS - RINGS - GEAR BLANKS - MISCELLANEOUS SHAPES
FORGED STEEL PIPE FLANGES
 LOW HUB - HIGH HUB - REDUCING - WELDING - SPECIAL SHIPMENTS FROM STOCK
PHILADELPHIA STEEL & IRON CO.
 COMMERCIAL TRUST BUILDING
 PHILADELPHIA, PA.

FORGINGS
 Hammered and Steam
 Hydraulic Pressed Forgings
 and
 OPEN HEARTH STEEL CASTINGS
 Large Capacity Prompt Shipments
ERIE FORGE CO.
 ERIE, PA.

 **Hammered Forgings** 
 The Machinery Forging Co.
 Cleveland
 INCORPORATED 1902



The **CLEVELAND HARDWARE CO.**
 CLEVELAND, OHIO.
 FORGINGS, STAMPINGS and
 FABRICATED STEEL

FORGINGS · HARDTEM DIE BLOCKS
KLEENKUT SHEAR KNIVES
 **HEPPENSTALL** 
 COMPANY
 PITTSBURGH, PA. BRANCHES IN PRINCIPAL CITIES

Drop Forgings
 of the Highest Quality
 THE D. WILCOX MANUFACTURING CO.
 MECHANICSBURG, PA.

R E W A R D
 2 to 1 We're Right
 You hold our bond. It GUARANTEES you Two
 perfect forgings for every defective K & B Forging
 that your inspectors can find.
 THE KILBORN & BISHOP CO., New Haven, Conn.
 HIGHEST QUALITY DROP FORGINGS

STORMS
 DROP FORGING
 COMPANY
 Quality Drop Forgings of Steel, Bronze,
 Stainless Iron, Monel Metal and Aluminum
 700 PAGE BOULEVARD
 SPRINGFIELD, MASS.

 **INDIANAPOLIS DROP FORGING Co.** 
 MANUFACTURERS OF DROP FORGINGS
 Established 1897
 INDIANAPOLIS, 1300 MADISON AVENUE INDIANA

 **DROP FORGINGS** OF THE HIGHEST
 QUALITY
 in steel and brass.
 SMALL AND
 MEDIUM SIZES
KEYSTONE FORGING CO., Northumberland, Pa.

GENERAL SPECIAL DROP FORGINGS
OF ALL KINDS TO ORDER

DROP FORGE CO.

SEND US PRINTS
OR MODELS
FOR PRICES

BUFFALO, N. Y.

MANGANESE STEEL
CASTINGS

THE FROG, SWITCH & MFG. CO.
ESTABLISHED 1881 CARLISLE, PA.

DROP FORGINGS

Always the same HIGH QUALITY—delivered when and as you order them.

U. S. BODY & FORGING CO., INC.
BUFFALO, N. Y.

Electric Acid Open Hearth
STEEL CASTINGS
Atlas Steel Casting Company
BUFFALO, N. Y.
New York Office: 60 E. 42nd St., New York.

DROP FORGINGS
The **BELDEN MACHINE Co.**
New Haven, Ct.

ELECTRIC
STEEL CASTINGS

Carbon Steel. Also Alloys chrome, nickel, vanadium. Modern plant. Good service.

CRUCIBLE STEEL CASTING CO.
CLEVELAND, OHIO

CASTINGS

DENOTES **(D)** DURABILITY

DUQUESNE STEEL FOUNDRY CO. Pittsburgh, Pa.

TREADWELL

ELECTRIC FURNACE
STEEL CASTINGS UP TO 6000 LBS.
Any Carbon or Alloy
High Pressure Castings a Specialty

TREADWELL ENGINEERING CO.
EASTON PENNSYLVANIA

AMSCO ABRASION RESISTANT

AMERICAN MANGANESE STEEL COMPANY

378 E. 14th Street
Chicago Heights, Ill.

MAYNARD ELECTRIC STEEL
CASTING COMPANY

Electric steel castings from 1 to
10,000 lbs. each

1-11 Kilbourn Road Milwaukee, Wis.

SPECIAL ALLOY CASTINGS

to resist OXIDATION, CORROSION, ABRASION
Modern equipment—Expert Metallurgical staff.
We solicit your inquiries

NATIONAL ALLOY STEEL CO.
BLAWNOX, PA.

From a Pound to a Ton **ELECTRIC** Inquiries Solicited
STEEL CASTINGS

CRUCIBLE STEEL CASTINGS COMPANY
LANSDOWNE, DELAWARE COUNTY, PENNSYLVANIA
(Near Philadelphia)

Strong Steel Foundry Co.

Acid open-hearth steel

Buffalo, N. Y.

TENSILE STRENGTH ELONGATION

The Cincinnati Steel Castings Co.

Manufacturers of
ELECTRIC STEEL CASTINGS

SPECIAL STEEL
Vanadium Chrome Case-Hardening Motor-Steel Nickel Steel

Spring Grove, Alabama and Bates Aves., Cincinnati, O.



Steel castings of every description ~ Inquiries solicited

AMERICAN STEEL FOUNDRIES

Address all communications to Dept. M.
Room 1684 Wrigley Bldg Chicago

Non-Ferrous CASTINGS

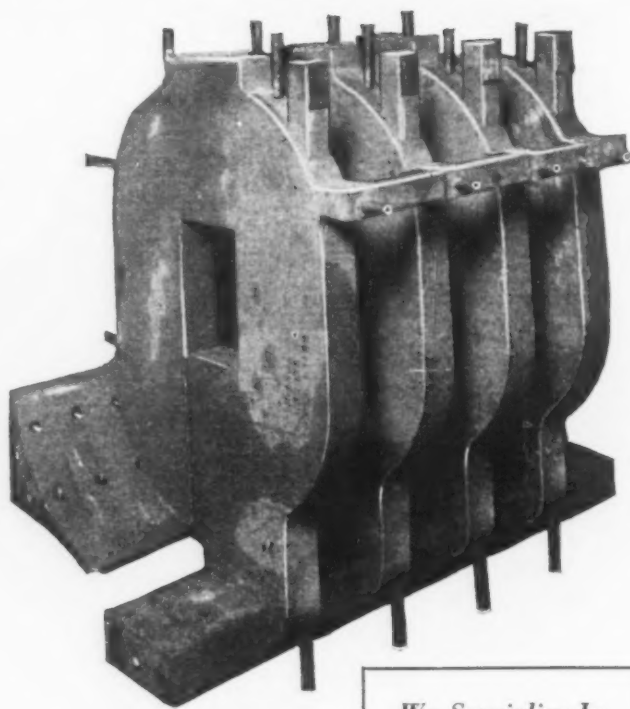
From 1 Oz. to 6000 Lbs.

The casting illustrated here contains 4500 lbs. of pure copper. We recently made four such castings for The Swift Electric Welder Company of Detroit. The iron pipes shown are cast into the copper.

Our wide range capacity also includes various kinds of metals—Aluminum Bronze Welding Dies, Acid-Resisting Castings, Manganese Bronze, Aluminum Alloys, Pure Copper Castings—made to your specifications.

If you require non-ferrous castings of higher quality, let us give you our quotations without any obligation to you.

The John Harsch Bronze & Fdry. Co.
11612 Madison Ave., Cleveland, Ohio



We Specialize In
...
Pure Copper Castings
Acid Resisting Castings
Manganese Bronze
Aluminum Bronze for
Welding Dies
Aluminum Alloy
Castings

SMALL ELECTRIC STEEL CASTINGS

(Capacity 500 Tons per Month)

THE

WEST STEEL
CLEVELAND



CASTING CO.
OHIO, U. S. A.

"He Profits Most
Who Serves Best"

Better Steel Casting

ELECTRIC STEEL CASTINGS

Service Quality

GEO. H. SMITH STEEL CASTING CO.
MILWAUKEE, WIS.
Chicago Office: 549 W. Washington Blvd.

Light Weight CERTIFIED MALLEABLE CASTINGS MEEKER FOUNDRY CO.

Malleable Founders for 85 Years

Clay Street

Newark, N. J.

MALLEABLE IRON CASTINGS

NEWARK MALLEABLE IRON WORKS

QUALITY

NEWARK, N. J.

SERVICE



Immediate Delivery

Small Electric Steel Castings

CALUMET ELECTRIC  **CASTING CO.**

Summer Boulevard - Hammond, Indiana



PEORIA
Malleable Castings Co., Peoria, Ill.

Castings of Guaranteed Quality
Peoria Detachable Sprocket Chain
Prompt Service and Shipments



**CERTIFIED MALLEABLE
CASTINGS**



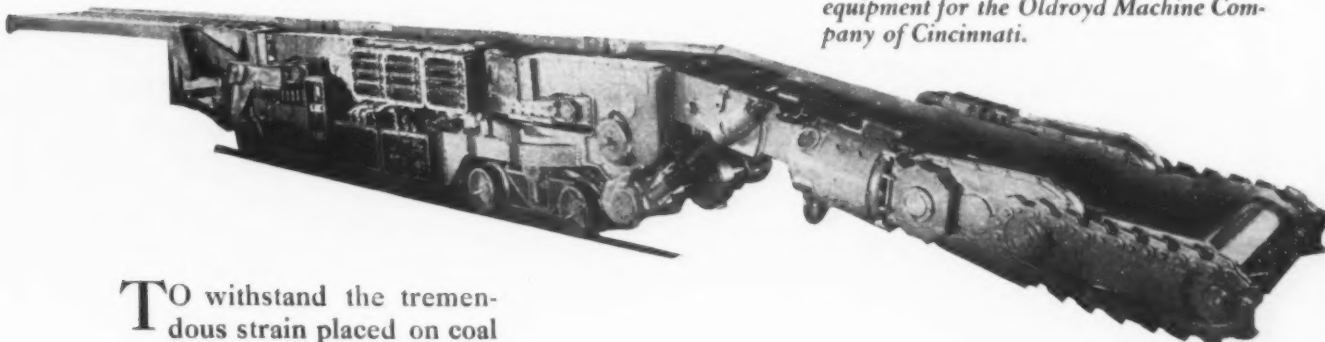
Steel castings of every description ~ Inquiries solicited
**AMERICAN
STEEL FOUNDRIES**

*Address all communications to Dept. M.
Room 1684 Wrigley Bldg. Chicago*

OLDROYD COAL CUTTER & LOADER

Castings by **COMMERCIAL**

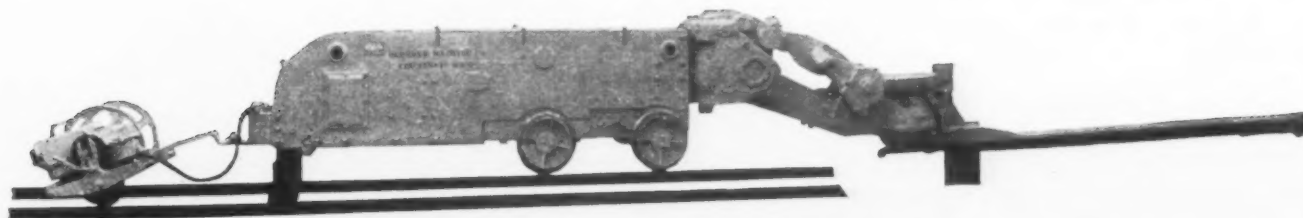
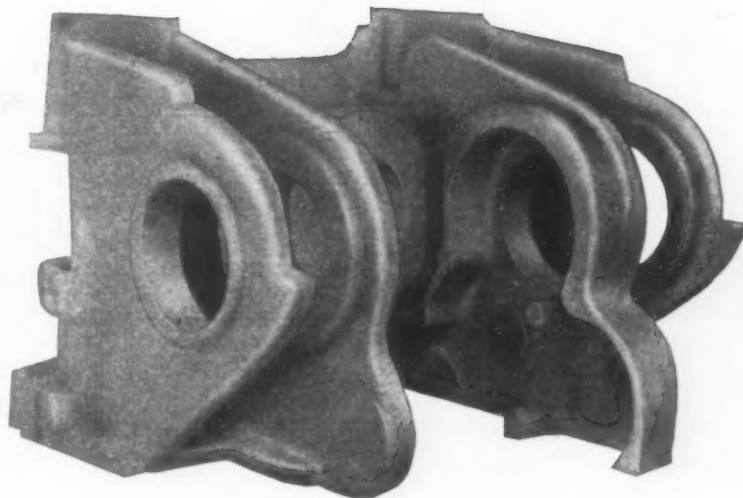
Oldroyd Coal Cutters and Coal Loaders provide for the most economical and rapid handling of coal from the seam to the mine car. The Webster Mfg. Company of Chicago, Ill., manufacture this equipment for the Oldroyd Machine Company of Cincinnati.



TO withstand the tremendous strain placed on coal mining machinery, the main construction especially must be built of the sturdiest castings available. Tensile strength is what counts

The Webster Mfg. Company has taken this into consideration in selecting The Commercial Steel Casting Company to furnish all of the main castings for Oldroyd coal cutters and coal loaders.

Skilled workmanship, highest quality steel, freedom from imperfections, and carefully worked out tensile strength requirements — these are the things that stand for Castings by Commercial.



THE COMMERCIAL STEEL CASTING CO.

Subsidiary of The Osgood Company

MARION, OHIO

Sales Offices

416 First National Bank Bldg.
Cincinnati, Ohio

1002 Tribune Bldg.
New York City

1623 Conway Bldg.
Chicago, Ill.

Fisher Bldg.
Detroit, Mich.

620 National Bldg.
Cleveland, Ohio

GRAY IRON CASTINGS

From the smallest up to 30 tons each

We Specialize in
FINE, SMALL HARDWARE CASTINGS
INGOT MOLDS FOR BRASS AND COPPER
MANHOLE FRAMES AND COVERS
BUILDING CASTINGS
GENERAL MACHINERY CASTINGS

We have 100 tons daily capacity to assure you prompt service; experienced foundrymen to assure you high quality castings; and order routing system that prevents delays; and fireproof storage to safeguard your patterns.



Send blue prints or sketches for an estimate.

THE SESSIONS FOUNDRY CO.,

Bristol, Conn.

Established 1879



Malleable Castings
of GUARANTEED QUALITY
for Railroad, Agricultural Implement
and Automobile Requirements

NORTHERN MALLEABLE IRON CO.
ST. PAUL, MINN.

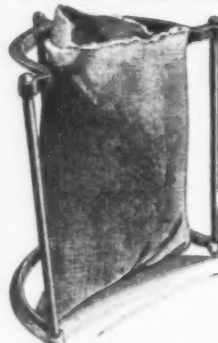
MALLEABLE IRON CASTINGS
Quality and Quantity Producers
VERMILION MALLEABLE IRON CO.

Manufacturers of

CERTIFIED MALLEABLE

1310 Railway Exchange Bldg. CHICAGO ILLINOIS 202 N. Sixth Ave. HOOPESTON ILLINOIS

Time Saved Is Money Saved



This Branford Bag Holder is a successful time saver wherever small parts of all kinds are packed in bags.

Its use makes bag packing a one-man job, permitting the man that formerly held the bag to perform more useful work.



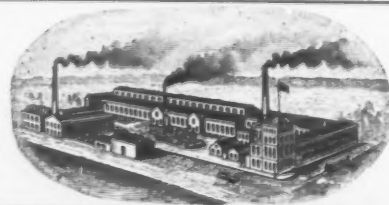
MALLEABLE IRON FITTINGS CO.
BRANFORD, CONN.

Richmond
malleable castings

RICHMOND MALLEABLE CASTINGS CO., RICHMOND, INDIANA

Light Gray Iron CASTINGS

Highest reputation for quality and service
Forest City-Walworth Run Foundries Co.
Cleveland, Ohio
Three individual foundries at your command



I.S. Spencer's Sons
INC.

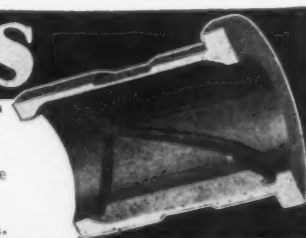
Guilford, Conn.

Manufacturers of Light
Grey Iron, Brass and
Bronze Castings
Patented Articles
General Hardware
Screw Machine Products
Polishing & Plating

CASTINGS

BRASS — BRONZE
ALUMINUM

All alloys and sizes from one ounce
to a ton. Ask for Bulletin A.
ERIE BRONZE CO.
1832 Chestnut St. Erie, Pa.



BRONZE
 CASTINGS FORGINGS - SHEETS RODS
 AMERICAN MANGANESE BRONZE CO.
 Founders and Metallurgical Engineers
 Holmesburg, Philadelphia, Pa.

Bronze Castings

Gear Bronze, phosphor bronze,
 Lumen bronze, manganese bronze,
 babbitts, solders, etc.

Let us have your address.

LUMEN BEARING COMPANY
 BUFFALO, NEW YORK

SHEET METAL WORK

Small orders solicited
 as well as quantity production.

OUR facilities consist of shearing and forming
 equipment up to 10' and 3/16", large number
 of presses, spot welders, oxy-acetylene and arc
 welders, also very complete japanning equipment.
 Plant is now specializing in automotive sheet
 metal work.

Send us drawings or samples for prices.

CHAMPION SHEET METAL CO., Inc.
 COR. SQUIRES & DUANE STS.
 CORTLAND, NEW YORK



STAMPINGS and SHEET METAL WORK

Our organization and equipment permit
 us to guarantee quality product and
 prompt delivery in any quantity.

Send Blueprint or Samples for Estimate

York Corrugating Company, York, Pa.



HEAVY MEDIUM

STAMPINGS

Send Samples or Blue Prints for Estimates

LANSING STAMPING CO.
 50. PENN. AVE.
 LANSING, MICHIGAN

District Sales Office—Harris Bldg., Dayton, Ohio

STAMPINGS

Complete Plant
 Over 30 Years' Experience

The **OTTO KONIGSLOW MFG. CO.**
 CLEVELAND OHIO



This Electric Clock Case

.037"
 8 1/4" high
 8 1/4" wide
 2 1/4" deep

—is just one of the many
 different kinds of stamped,
 drawn, and pressed metal
 parts we produce in large
 quantities. Let us give
 you an estimate on your
 work—or let our engi-
 neering department make
 recommendations.



THE SEYMOUR PRODUCTS CO.

The H. A. Matthews Mfg. Co.
 The Seymour Metal Goods Co.
 99 RIVER ST., SEYMOUR, CONN.
 EST. 1890

We Do Difficult Stamping Jobs Well

That particular job—why not let our experience and facilities take
 care of it efficiently, at a reason-
 able cost?



Send along your blueprints for quo-
 tations. MAKERS OF "TROUBLE-
 FREE" STAMPINGS.

New England Pressed Steel Co.
 1 Washington Av., Natick, Mass.



HEAVY PUNCHINGS

LIGHT STAMPINGS

Washers Our Specialty

70 years Assortment of Punches and Dies
 enables us to furnish variety of Washers
 without tool charges.

THOMAS SMITH CO.
 286 Grove St., Worcester, Mass.

METAL STAMPINGS

SAVE MONEY - SPEED PRODUCTION

THE AMERICAN PULLEY CO.
 PHILADELPHIA

MULLINS for

QUALITY STAMPINGS AT THE RIGHT PRICE

MULLINS MANUFACTURING CORPORATION

MAIN OFFICE AND WORKS—SALEM, OHIO

in the Pittsburgh and Cleveland districts

Chicago: 332 South Michigan Ave.

Detroit: 7-252 General Motors Bldg.

DETROIT METAL SPECIALTY CORP.

STAMPED, PRESSED & DEEP DRAWN
 PARTS IN ANY COMMERCIAL
 METAL AND IN ANY FINISH

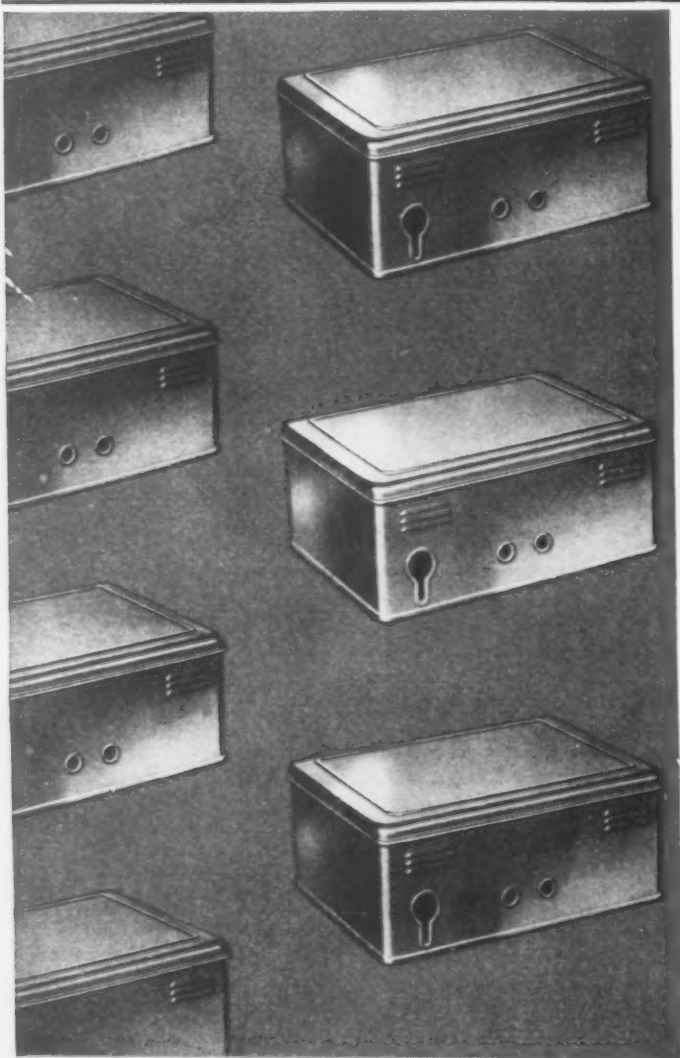
DETROIT METAL SPECIALTY CORP.
 DETROIT, MICH.

STAMPINGS PRESSED METAL

IN ALL METALS AND GAUGES.
 DRAWN, FORMED, STAMPED AND ASSEMBLIES.

THE METAL SPECIALTY CO.
 1533 WEST SIXTH ST., CINCINNATI, O.

WHY . . . Metal Stamping Quotations Vary So Much . . .



The essentials in producing this radio cabinet were interchangeability of parts to save assembly time, and attractive appearance. G. P. & F. engineers found a way to combine these two elements successfully and economically.

IMPORTANT FACTORS to Consider in Bids You Get

WHEN quotations on metal stampings vary considerably, experienced buyers do find out the reason for the difference before placing the order.

Often it is found that the blueprint submitted is made up with a casting in mind, or with features which are not practicable, or without specific tolerances indicated. Naturally, such blueprints are interpreted differently by the various bidders, which reflects in the quotations.

In securing bids all of these factors should be taken into account, especially the correct indication of tolerance requirements, as tolerances affect the piece price very materially. This procedure provides a definite basis for all bidders to work on, and prevents trouble later on.

The final consideration is the stamping experience of the bidders. G. P. & F. this year celebrating its fiftieth anniversary, has the background necessary to appreciate the problems involved in practically every kind of light weight and medium stamping. Thus, in addition to quoting intelligently G. P. & F. is able to offer suggestions that often not only improve the design but lower production cost as well.

Why not consult G. P. & F. for suggestions and quotations?

GEUDER, PAESCHKE & FREY CO.

*Sales Representatives in Principal Cities
in all Parts of the Country*

1352 St. Paul Avenue, Milwaukee, Wis.
338 W. Ohio Street, Chicago, Ill.

G. P. & F. STAMPINGS



GEUDER, PAESCHKE & FREY CO.

1352 St. Paul Ave., Milwaukee, Wis.
338 W. Ohio St., Chicago, Ill.

Please send your 1930 Booklet,
"In Harmony with Modern Progress," to the
address below. It is understood the writer is
not obligated.

Name _____

Company Name _____

Address _____



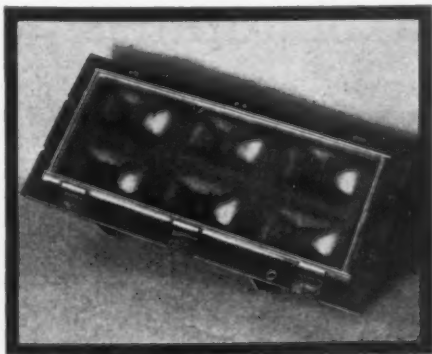
STAMPINGS BENEFIT EVEN CAST STONE

Old-time cast-iron moulds cost 54% more than Bossert Stampings—were 64% heavier. Stampings speeded production and improved the product.

YOU will find interest in this episode of the cast-stone industry because it illustrates the wide usefulness of pressed metal—its wide adaptability.

Cast-stone, a cement product, is poured cold in moulds. The stone must harden smoothly and accurately like a die-casting, because cast-stone obviously cannot be "machined" after casting. At the foot of this column is a photograph of the stamped mould. The old-time casting cost 54% more to begin with, and weighed 64% more. The stamped mould is much stronger. It never breaks when dropped. Breakage of cast iron moulds was frequent. Its lighter weight enables a man to lift it more easily—hence he can lift more in a day. Multiply this alone by a corps of men—the effect on production is clear.

The smoother, more accurate surfaces of the stamping produce smooth stone. It is so smooth that it appears almost to have been chiselled and polished by hand; and it fits as though machined.

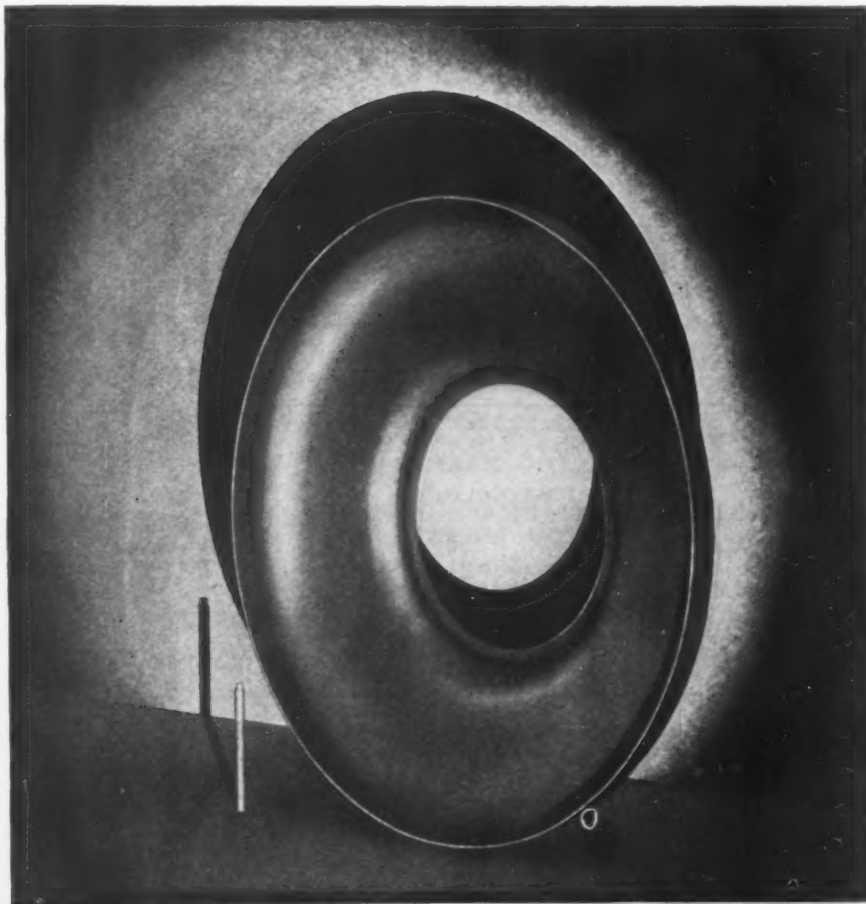


It is gratifying to see how Bossert stampings benefit an industry so remote from manufactured metal parts. And there is food for thought in this for every industry everywhere — "wouldn't stampings be better for us, too?"

BOSSERT STAMPINGS—light and heavy—are used to advantage by nearly every industry. A huge plant, with complete equipment, assures fast quantity production.

Below are two interesting Bossert stampings—a drum head for a concrete mixer and a one piece, drawn steel bottle. They show the great versatility of the Bossert organization.

A copy of the intensely informative Bossert book, *Metal Stampings*, awaits your request. Send for it now. It gives you a definite idea of the Bossert organization and explains Bossert re-designing service. The Bossert Corporation, Utica, New York. Offices in New York, Philadelphia, Cleveland and Detroit.



Drawn steel bottle
Height 12 inches

Concrete mixer drum head
Height 53 inches



BOSSERT STAMPINGS



Good Will Can't Be Measured In Dollars and Cents

It doesn't take much to obtain a customer's good will—prompt delivery, efficient service, a quality product and it's done.

The best evidence of the "goodwill" obtained by WORCESTER STAMPED METAL PARTS is shown in the increasing number of orders received—not only from our old customers, but from their friends as well.

WORCESTER STAMPED METAL CO.

Successors to W. & S. Mfg. Co. Established 1883
WORCESTER MASSACHUSETTS
Philadelphia Representative: H. L. HESS CO., 2106 West Atlantic St.



SHUTTER LOUVRES

In any quantity desired. We are in a position at this time to give you an attractive price and prompt delivery.

We also make stamped Louvres with permanent openings to your requirements.

SHEET METAL PARTS

*Made to your order with exactness and skill
at moderate prices*

THE BREESE BROS. CO.

Cincinnati, Ohio

MAKERS OF
TOTE BOXES—SHOP BOXES
—PICKLING BASKETS
FABRICATORS OF
STEEL—IRON—BRASS—COPPER
—MONEL METAL

Requiring
Stamping—Forming—Drawing
Blanking—Punching

See Data A.S.M.E. Mechanical Catalogue
McRae Hendricks and Thomas Catalogues

TAMPINGS

Redevelopment or Redesigning that Lowers Costs

We specialize in the redevelopment of small and medium castings into lighter, less expensive stampings, and the redesign of stampings to assure greater fitness at lower costs.

If you will forward us drawings or samples with your approximate quantity requirements we will gladly show you where AKRON-SELLE Engineering Service can help you.

Our present customers represent many of the most discriminating parts buyers in the automotive, furniture and general metal goods fields. May we serve you?

We also
make
Welded
Rings
and
Bands
6" to 60"

The
AKRON-SELLE CO.
AKRON OHIO
43 Years in Business

"Bridgeport"

STAMPINGS

BRASS
BRONZE • COPPER
AND ALUMINUM

Rough, semi-finished, finished or assembled. Complete engineering service, unlimited facilities for producing and assembling. Send drawings, blue prints, or samples for quotations.

BRIDGEPORT BRASS CO.
BRIDGEPORT, CONN.

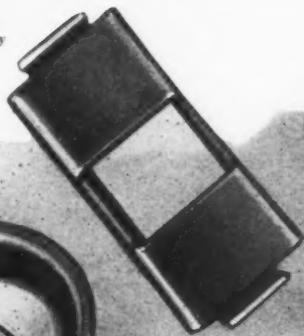
Metal Stampings

OURS is a completely equipped plant especially adapted for producing metal stampings of all kinds. Comprehensive facilities also permit assembling of complete units.

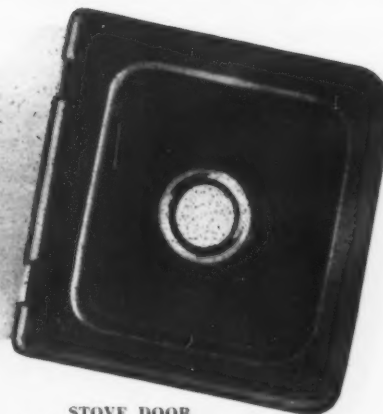
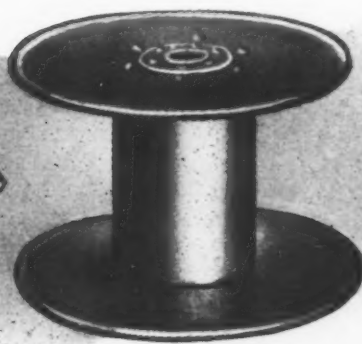
We would appreciate the opportunity of competing for your requirements.

The Globe Machine & Stamping Co.
1250 W. 76th St. Cleveland, Ohio

JOURNAL BOX LINER
for roller bearing railway
truck.



WIRE REEL
14 gauge heat treated.
No wire in head.



STOVE DOOR
1/16 gauge enameling steel.

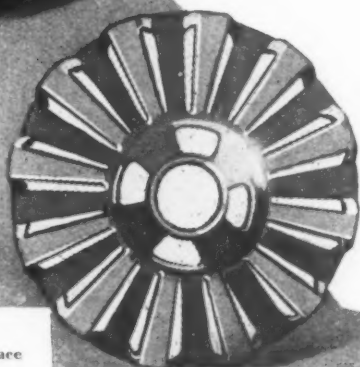
BRAKE DRUM
1/4" high carbon steel



FLANGED END
pressed stamping 1/4"
steel



AXLE FLANGE
pressed forging. Made with-
out draft.



DIFFUSER
for oil burning furnace
.078

PARISH

Stampings used in many industries

The stampings shown here are only a few of a wide variety of parts made in the Parish plant—specialists in heavy steel stampings, hot pressed forgings and heat treated chassis frames.

We have unusual facilities for producing heavy stampings up to fifty feet long or small intricate parts, stamped or hot pressed. Specially designed presses, and large, continuous heat treating furnaces are capable of producing a wide range of work with great accuracy and economy.

Parish engineers have cooperated with many manufacturers in the design and development of parts with very satisfactory results—and they are ready to help you as they have helped others. Why not consult them?

PUT IT UP TO

Parish

PRESSED STEEL CO.
of READING, PA.

Pacific Coast Representative—F. SOMERS PETERSON CO.,

57 California St., San Francisco, Cal.

ASSOCIATED **Spicer** COMPANIES

BROWN-LIPE
CLUTCHES and
TRANSMISSIONS

BROWN-LIPE GEAR CO.
SYRACUSE, NEW YORK

PARISH
FRAMES AND
STAMPINGS

PARISH PRESSED STEEL CO.
READING PENNA.

SALISBURY
FRONT and REAR
AXLES

SPICER MFG. CORP.
TOLEDO OHIO

SPICER
UNIVERSAL
JOINTS

SPICER MFG. CORP.
TOLEDO OHIO



**PERFORATED
FOR EVERY
REQUIRE-
MENT
METALS**

Not merely "punching holes in metal." With us, perforating is a specialty requiring knowledge of both metal and dies. Perforated metal for screening, sorting, draining, sieving, ventilating—Grills, Guards and Partitions.

Our die stocks are large, our prices are moderate, our production is fast and we give personal attention to your order.

THE HARRINGTON & KING PERFORATING CO.
5657 FILLMORE STREET-CHICAGO, ILL., U.S.A.
New York Office, 114 Liberty St.

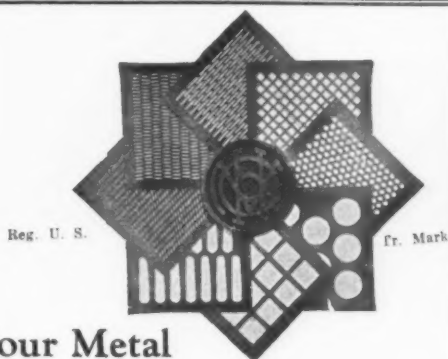


**PERFORATED
METALS**

Made with any size, shape or arrangement of perforations and of any metal or material, there is a Mundt product suitable for every requirement.

We also make Conical Slot Sugar Centrifugal Screens.

Chas. Mundt & Sons
59 Fairmount Avenue
Jersey City
New Jersey



Reg. U. S.

Fr. Marb

Name Your Metal

... we'll get it

Name Your Style Opening

... we'll have the die

While we make it a point to carry substantial stocks of the metals more commonly used for perforated plate screens, we have arrangements for getting promptly plate of practically any metal. Name what you want and we'll get it.

Our supply of dies covers a very wide range of openings or if necessary, we'll make up special dies. So name the size and style of opening and we'll have it.

HENDRICK MANUFACTURING CO.

37 Dundaff Street

Baltimore Birmingham Boston Cincinnati Cleveland
Detroit Hazleton New York Philadelphia Pittsburgh

Makers of Mitco Interlocked Steel Grating,
Mitco Shur-Site Treads, Mitco Armorgrids and
Elevator Buckets of all types.

PERFORATED ERDLE METALS

SPECIAL WORK?

Our half century of experience and our facilities are adequate to insure the kind of service you require on standard work or work of special nature. Our service department will be glad to co-operate with you.

A stock of Perforated Machinery Guard material always on hand.

Aluminum, Tin, Zinc, Brass, Copper,
Steel and Other Metals and Materials

ERDLE PERFORATING CO.
Rochester New York

**PERFORATED METALS and
SCREENS OF ALL KINDS**

MATERIAL IN STOCK
PROMPT SHIPMENT

Chicago Perforating Co.
2445 West 24th Place
Tel. Canal 1459 CHICAGO, ILL.

►► **HAGER** ◀◀

WROUGHT STEEL
Stampings — Hinges — Washers

C. HAGER & SONS HINGE MFG. CO.
2400-2457 DeKalb Street St. Louis, Mo.

OILLESS BUSHINGS AND BEARINGS

METALINE
(Reg. Trade Mark)
that require no attention
Write for information

R. W. RHOADES METALINE CO., Inc.
Tel. Hunters Point 2318 43 3rd St., Long Island City, N. Y.

**BUCKEYE
BETTER BUILT
BEARINGS**

FINISHED
STOCK BUSHINGS
Send for stock card
BRONZE BARS
CORED & SOLID
Send for weight chart

Sustained accuracy, service that is dependable, and speed that is safe. These are the results of good bearings—the difference between profit and loss when expenses are figured. Consult us about your problems.

BUCKEYE BRASS & MFG. CO.
6410 Hawthorne Ave., Cleveland, Ohio

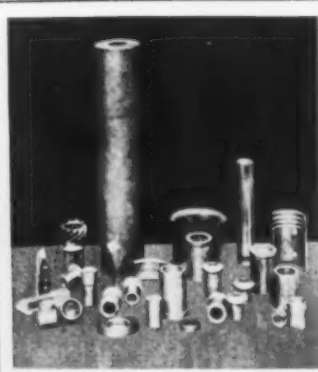


INGOTS



SOLID AND CORED BARS

Use
"SABECO"
REG. U. S. PAT. OFF.
METAL
 The Certified
 Bearing Bronze
 Cuts Costs
 All Around



FINISHED PARTS



CASTINGS

IF you are seeking a bronze bearing metal of extraordinarily long life, you will find it in "SABECO." But you get more than long life! It withstands every service condition—heat, high speed, low speed, minimum lubrication, acid, pounding and strain—it is chatterless and has a very low coefficient of friction.

"SABECO" reduces costly machine shutdowns for bearing replacement, enabling you to make real worth-while savings on man and machine hours that are usually charged off to "Repairs."

A trial order will convince you of its worth. If you are not entirely satisfied, return it and you pay nothing.

FREDERICKSEN COMPANY

811 S. Water St., Saginaw, Michigan

5-108 General Motors Bldg., Detroit, Mich.
 Room 418-E, 30 Church St., New York City
 634 Slater Bldg., Worcester, Mass.

"SABECO"
REG. U. S. PAT. OFF.

NO. 9 SOLID AND CORED
 BARS CARRIED IN STOCK.
 ASK YOUR MILL
 SUPPLY JOBBER.

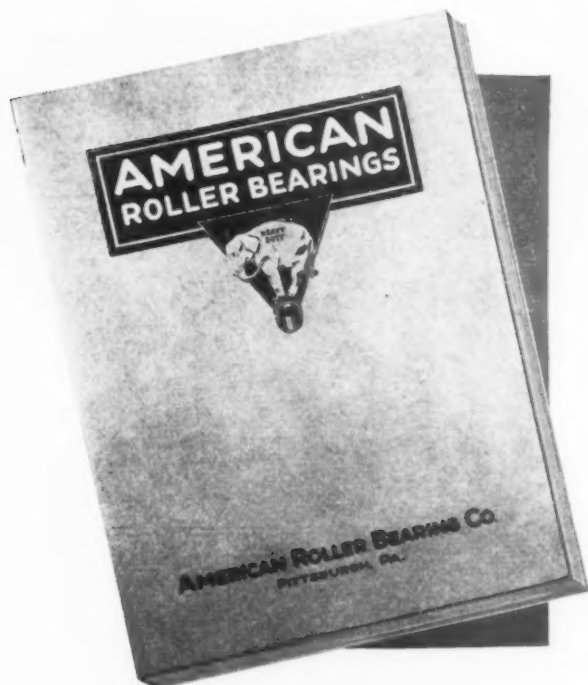
"Know Your Bearings"

"SABECO"
REG. U. S. PAT. OFF.
METAL

INGOTS, SOLID
 BARS, CORED BARS
 CASTINGS FINISHED
 TO SPECIFICATIONS

The Certified Bearing Bronze

A New Catalogue on just one subject



We shall be glad to send
this catalogue promptly
to any manufacturer
or user of Heavy Duty
machinery or equipment

HEAVY DUTY ROLLER BEARINGS

THIS is it . . . the big 76-page edition
that puts at your fingertips sketches,
tables, details and photographs represent-
ing over 15 years' concentration on one
subject . . . HEAVY DUTY Roller Bear-
ings for radial loads.

For example . . . industrial installation
drawings of *retaining plate construction*,
doweling inner races, *controlling thrust*
. . . drawings of usual methods of install-
ing bearings on specific items of equip-
ment . . . pictures of typical products
equipped with these bearings.

American Bearings are manufactured in
three types: "Medium Duty," "Heavy
Duty" and "Super Heavy Duty." Com-
plete sizes are listed in this catalogue.
Yours for the asking.




HEAVY DUTY AMERICAN

AMERICAN ROLLER BEARING COMPANY, PITTSBURGH, PA.

Frank M. Cobbledick Co.
1031 Polk St., San Francisco

Pacific Coast
Representatives

Edward D. Maltby Co.,
321 W. Pico St., Los Angeles




SHENANGO-PENN
Centrifugally Cast Bronze Bushings
 Stock sizes in all lengths up to six feet and in outside diameters 2 to 6 inches
SHENANGO-PENN MOLD CO., Oliver Bldg., Pittsburgh, Pa.
Plants at Dover, Ohio and Sharpsville, Pa.

AUBURN BALL BEARINGS

answer bearing difficulties. Send particulars of your problem or ask for data sheets.




Auburn Ball Bearing Co.
 63 Clarissa St., Rochester, N. Y.



**STRONG
CARLISLE
&
HAMMOND**

MAC-IT Hollow Safety Set and Cap Screws. 1396 W. 3rd St., Cleveland, O.



Ask for Catalog.

Time

Tempus Fugit: Roman axiom. Time flies; it cannot be retained or recouped; it exists only to be lost. Repairs are not time-worthy; ensure operating continuity with Rollway Bearings.

ROLLWAY BEARING COMPANY
 SYRACUSE INCORPORATED
 NEW YORK




SCREW PRODUCTS


made by Olson are as good as twenty-five years' experience and up-to-date equipment can produce. To end your screw product problems, call on Olson.

Made in all sizes up to 2 1/4" in steel and brass.

OLSON MFG. CO.
 53 Commercial St., Worcester, Mass.
 New York Office—5 Beekman Street
 Philadelphia Office—15th and Chestnut Streets

The **BANTAM BALL BEARING CO.**
 SOUTH BEND INDIANA
 JOURNAL — RADIAL — THRUST

Ball and Roller Bearings, 1/2" to 40" in diameter—ONE OR A MILLION. Standard and special size.
 New York, Detroit, Chicago, Pittsburgh, Cleveland, St. Louis



Packed in Cartons and Kegs

You can draw upon 20 million Cleveland Cap Screws stocked at Chicago, Detroit, Philadelphia, New York, San Francisco and Los Angeles.

THE CLEVELAND CAP SCREW CO., 2928 East 79th St., Cleveland, O.



281,500 LBS.

that's the ultimate strain per square inch of a 1/4" "Unbrako" Socket Head Cap Screw according to the Olsen Testing Machine—or put it another way, it took 3 1/2 tons to pull a 1/4" "Unbrako" apart.

Free samples—Complete stocks. Sold by Dealers Everywhere.

STANDARD PRESSED STEEL CO.
 Box 523 Jenkintown, Pa.

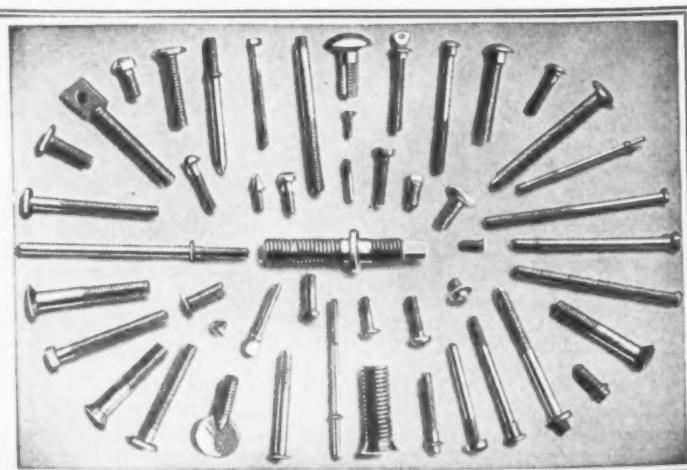


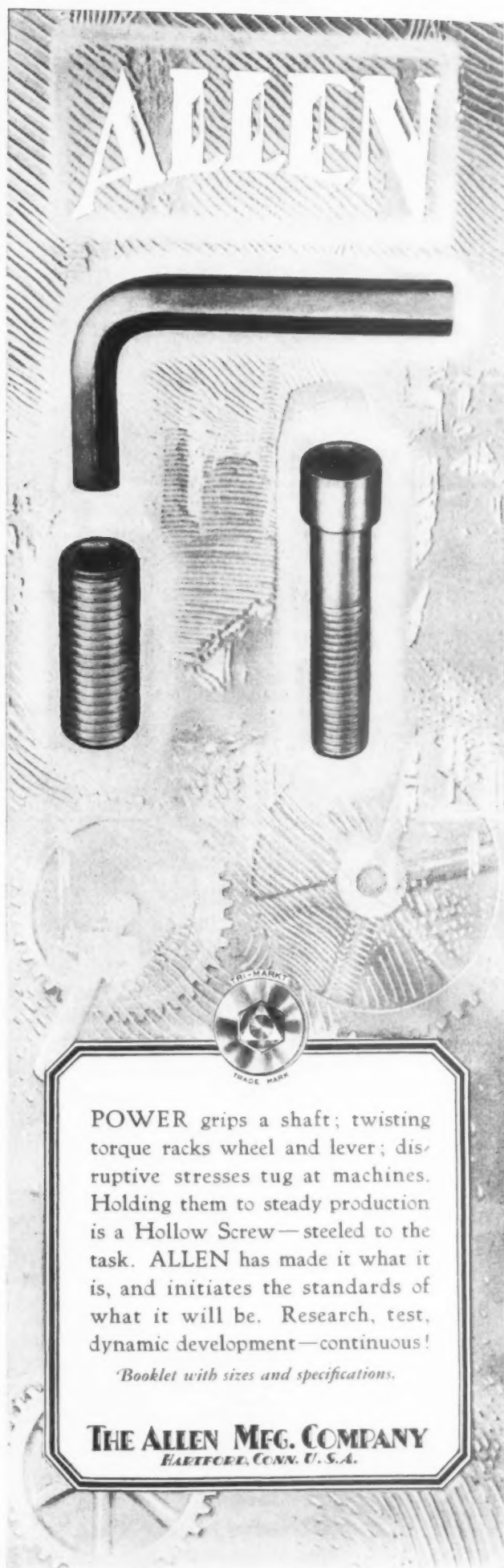

HEADING SPECIALISTS

A great many products at present milled from the bar can be developed by our process at a great saving. The illustration shows a variety of products we have developed for other manufacturers by the cold heading process.

If you have similar requirements let our specialists cooperate with you. There is a large price advantage and it will pay you to get in touch with us.

The Progressive Manufacturing Company
 TORRINGTON, CONN., U. S. A.
IN STOCK AT ALL TIMES
 Standard Machine Screws
 Machine Screw Nuts
 Interchangeable bolts and nuts made strictly to A.S.M.E. tolerances.





ALLEN

POWER grips a shaft; twisting torque racks wheel and lever; disruptive stresses tug at machines. Holding them to steady production is a Hollow Screw—steeled to the task. ALLEN has made it what it is, and initiates the standards of what it will be. Research, test, dynamic development—continuous!

Booklet with sizes and specifications.

THE ALLEN MFG. COMPANY
HARTFORD, CONN. U. S. A.



**One
Standard
of Quality in
every Type and Size**

**Reed and
Prince
Products
include:**

Wood Screws
Machine Screws
Cap Screws
Set Screws
Stove Bolts
Sink Bolts
Hanger Bolts
Machine Screw Nuts
Stove Bolt Nuts
Chair Rods
Stove Rods
Seat Rods
Specialties

Available in any finish — nickel, blued, copper, bronze, brass, galvanized, plain, polished, cadmium, chromium.

Reed & Prince Screw Products can be depended upon for unvarying uniformity in strength, finish and dimensions. Every Screw, Nut and Bolt meets the highest standards of quality and accuracy.

For **GOOD WORK** use dependable Reed & Prince Products. Your largest requirements can be handled promptly. May we submit samples and prices.

REED & PRINCE MFG. CO.
WORCESTER, MASS., U.S.A.
WESTERN BRANCH AT CHICAGO - 3635 IRON STREET



Wood Screws
Drive Screws
Coach Screws
Machine Screws
Set Screws
Cap Screws
Thumb Screws
Special Automatic Screw
Machine Products
Stove Bolts
Tire Bolts
Sink Bolts
Machine Screw Nuts
Stove & Tire Bolt Nuts
USS Nuts
SAE Castellated Nuts
SAE Plain Nuts
Jack Chain
Plumber's Chain
Register Chain
Safety Chain
Furnace Chain
Ladder Chain
Sash Chain
Escutcheon Pins
Speedometers
Tachometers

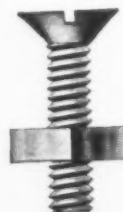
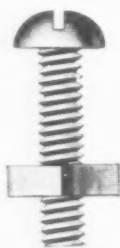


UNIFORM QUALITY *and* ADEQUATE STOCK

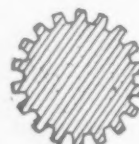
The CORBIN SCREW CORPORATION

The American Hardware Corp., Successor
NEW BRITAIN, CONN.

Warehouse—New York, Chicago, Philadelphia
Western Factory—Dayton, Ohio



CUT THESE FROM THE BAR



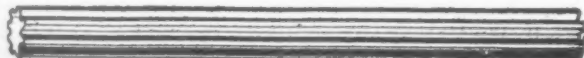
Don't machine them from solid stock. We will supply you with pinion rods, squares, flats, hexagons and other wire shapes for less money than you could possibly make them.

Write for our interesting proposition to-day.

A. B. & J. Rathbone
Palmer, Mass.

Michigan
Agents

Geo. E. Quigley, Inc.
1908 Washington Blvd. Bldg.
Detroit, Mich.



SHIMER



SCREW MACHINE PRODUCTS

Milled from the bar with die-cut threads.
1/16" to 3". Iron, Steel or Brass.

Samuel J. Shimer & Sons, Milton, Pa.

Western Screw Products Co.

St. Louis, U. S. A.



Screw Machine Products
Castle Nuts—Set Screws—Cap Screws

SCREW MACHINE PRODUCTS

ACCURATELY MADE AT A FAIR PRICE
ARE MORE ECONOMICAL

Specialists in the production of screw machine products for 15 years. Let us quote on your requirements.

Screw Machine Products Corp., 1014 Eddy St., Providence, R. I.

See Our Full Page Ad
In Last Week's Issue



The National Acme Co.
Cleveland, Ohio




FOR
REAL
SERVICE
USE
CLARK

**BOLTS
NUTS
SCREWS
& RIVETS**

*Considering the
Quality,
the prices are
surprisingly low.*

CLARK BROS BOLT CO.

CLARK STREET
MILLDALE, CONN.



Screw Machine Products
**CAP AND SET
SCREWS**

The
Wm. H. Ottemiller Co., Inc.
Pattison St. and M. & P. R. R. York, Pa.

REASONABLE PRICES DELIVERIES PROMPT

BELCO PRODUCTS ARE

SCREW MACHINE
REPEAT ORDERS
PRODUCTS

YOUR ORDERS ARE SAFE
IN OUR HANDS

THE DAVID BELL COMPANY, INC. BUFFALO, N.Y.

IF ITS MILLED FROM THE
BAR-WE'LL MAKE IT-

Buffalo Bolt Co.
North Tonawanda, N. Y.

**BOLTS, NUTS, LAG SCREWS
STEEL BARS, WIRE**
of exceptional quality

SALES OFFICES:
Chicago Detroit

BOLTS TRACK MACHINE
EST. 1859

SPIKES TRACK, BOAT
DOCK, GUARD

BARS IRON
STEEL

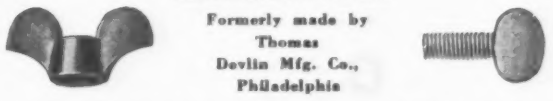
W. AMES & CO. FACTORY & OFFICE
JERSEY CITY, N.J.



STANDARD and SPECIAL
NUTS
MILLED FROM BAR
WESTFIELD NUT COMPANY WESTFIELD,
MASS.

THUMB NUTS and THUMB SCREWS
MALLEABLE IRON

Formerly made by
Thomas
Devlin Mfg. Co.,
Philadelphia



We carry a large stock and variety of
styles and sizes of thumb nuts and
thumb screws, threaded and blank.

Malleable and Grey Iron Castings

Philadelphia Hardware & Malleable Iron Works, Inc.
9th and Jefferson St., Philadelphia, Pa.





THIS *familiar* MARK

THE synonym for dependability in bolts, nuts and rivets the world over—as indicative of quality as sterling is to users of fine silverware—backed by the pride of one of America's pioneer bolt and nut manufacturers.

Every detail in the manufacture of Oliver Bolts is one of the most exacting care even to the wrapping, packing and shipping. Every package or carton contains a full count—every box is tightly packed for proper shipment—every keg is filled to capacity. Even the labeling of each box or carton has been especially selected to assure maximum visibility in the darkest warehouse.

Such are the little details that make "Oliver Pittsburgh" stand for everything that's great in the world of bolts and nuts.

**Oliver Iron and Steel
Corporation**
PITTSBURGH, PA.

Sales Offices:

New York	Kansas City	Dallas	Chicago
Cincinnati	Atlanta	Philadelphia	
St. Paul	Detroit	Cleveland	



RHODE ISLAND TOOL COMPANY

(ESTABLISHED 1834)

NUTS — BOLTS — SCREWS — WRENCHES
SCREW MACHINE PRODUCTS
DROP FORGINGS

SEND US YOUR SPECIFICATIONS

PROVIDENCE - - - RHODE ISLAND



Neely
NUT & BOLT CO.
PITTSBURGH, PA.

BOLTS-NUTS-RIVETS-RODS-UPSET FORGINGS

True Tolerance
Victor Rivets
Chain Pins
Coupler and
Air Brake Pins
Toncan Iron
Stainless Steel

THE CHAMPION RIVET CO.
EAST CHICAGO, INDIANA CLEVELAND, OHIO

PUNCH PRESS PRODUCTS

WE MANUFACTURE
WASHERS
RIVETING BURRS
METAL STAMPINGS

THE MASTER PRODUCTS CO.
6420 PARK AVE., S.E. CLEVELAND, O.

"The World's Largest
Producer of Washers"

**MILWAUKEE
WROT WASHERS**

We Also
Manufacture
Metal Stampings

WROUGHT WASHER MFG. CO.
Established 1887
MILWAUKEE WISCONSIN



EAGLE BRAND RIVETS, WASHERS

Special Rivets and Washers of Brass,
Bronze, Copper and Nickel Silver

made to order for all purposes.

Copper Belt Rivets—Burrs and
Bolt Size Brass Washers

carried in stock for immediate shipment.

THE PLUME & ATWOOD MFG. CO.
WATERBURY CONN., U. S. A.

Turn Your Locking Problems Over to



SHAKEPROOF

LEADING manufacturers in hundreds of industries have solved their locking problems by using Shakeproof on their products. Better performance, fewer customer complaints and reduced service costs have proved that Shakeproof Lock Washers are a real contribution to industrial progress.

The fact that the Shakeproof multiple-locking principle can also be incorporated in other parts means that a substantial saving is made possible by eliminating the purchase of separate lock washers and also in reducing the number of assembly operations. Our Shakeproof engineers are at your service and will gladly consult with you regarding your locking problems without cost or obligation to you.

Decide now to test Shakeproof on your product. Free samples of any type or size will be sent on request and, if you desire, a Shakeproof engineer will call and personally study your problems.

Write for your free samples today!

SHAKEPROOF
Lock Washer Company

{Division of Illinois Tool Works}

2525 North Keeler Avenue, Chicago, Illinois

U. S. Patents: 1,419,564
1,604,122—1,607,954
Other patents pending.
Foreign patents.



*"It's the
Twisted Teeth
that LOCK"*



Type 12. Internal
For S. A. E. and Standard
Machine Screws

Type 11. External
For Standard Bolts
and Nuts

Type 15. Countersunk
For all Countersunk
Screws

Type 20
Locking Terminals
For Radio and Electrical Work



WROUGHT WASHER CO.

You will find our service a source of great satisfaction in the prompt supply of washers and Light Steel Stampings.

JOLIET
Wrought Washer Company
Joliet, Ill.

Washers
Standard and special shapes and sizes.
Any quantity.

PRENTISS WIRES

Specialties in wire drawn from Swedes Iron, Bessemer, Open Hearth and Crucible Cast Steel.

Special Wires from Carbon Steels of Particular Analyses

ESTABLISHED IN 1857

GEO. W. PRENTISS & CO.
HOLYOKE, MASS.

NICETOWN PLATE WASHER CO., Inc.

IRON AND STEEL BARS
DEFORMED STEEL BARS THREADED RODS
HEAVY DISCS OR WASHERS SQUARE WASHERS
BEVEL WASHERS MANHOLE STEPS SEWER STEPS
HOT GALVANIZED BARS AND WASHERS

JUNIATA AND CLARISSA STS.
NICETOWN, PHILA., PA.



**RIVETED KEYS - FLAT SPRING KEYS
- COTTER PINS -**

WESTERN WIRE PRODUCTS CO.
ST. LOUIS, U.S.A.



MUSIC WIRE

THE WEBB WIRE WORKS
NEW BRUNSWICK, N.J.



SPRING COTTERS

of all descriptions—
Flat or round. Let us quote you on stock sizes. Prompt deliveries.

F. P. SMITH & COMPANY, Manufacturers
SHARON HILL, PA.

HIGH CARBON

STEEL WIRE

JOHNSON STEEL & WIRE CO., Inc.
WORCESTER, MASS.

CLEVELAND DOUBLE CRIMPED WIRE CLOTH




Manufacturers of

Locomotive Stack Netting, Sand, Gravel and Mining Screens, Filter, Cement and Rice Mill Cloth, Rolled Slot and Square Mesh, made from all metals.

10 mesh .047 wire 6 mesh .092 wire

Once tried, always used.

THE CLEVELAND WIRE CLOTH & MFG. COMPANY 3571 E. 78th St., CLEVELAND, OHIO



Buffalo WIRE

"A BETTER WIRE CLOTH"

For all industrial purposes. Prices and information on request.

BUFFALO WIRE WORKS CO., Inc.
156 Terrace (Formerly Scheeler's Sons) Buffalo, N. Y.

PAGE WIRE PRODUCTS

Spring wire - Fence - Welding wire - Plain and Galvanized wire - Strand - Special analysis wire

PAGE STEEL and WIRE COMPANY

General Sales Office:
New York Central Bldg., 230 Park Ave., New York, N. Y.
District Offices: Chicago New York Pittsburgh San Francisco
An Associate Company of the American Chain Co., Inc.





MICHIGAN WIRE CLOTH CO.

ESTABLISHED 1864
EVERYTHING IN WIRE CLOTH

Pioneers in the manufacture of DOUBLE CRIMP WIRE CLOTH and WIRE SCREENING of every kind possible to weave, made of Steel, Iron, Brass, Copper, Bronze, Aluminum, German Silver, Pure Nickel, Galvanized, Tinned and Monel Wire; also WIRE LATH, etc.

Also drawers of Brass, Copper, Bronze, German Silver, Pure Nickel, Aluminum, Monel Metal Wire, etc.

2117 HOWARD STREET, DETROIT, MICH.

Write for Catalogue No. 25



We comb the country for this scarce and costly metal!

TO THE EYE...MERELY SCRAP...an unsightly, tangled mass of metal. Yet we have to shop the country over to find it!

It is one of the several materials used in making acid steel for Roebling "Blue Center" Steel Wire Rope... and is the purest low phosphorus melting stock obtainable... scarce... expensive.

We spend a lot of time searching for this

costly metal... and in analyzing it. We also exercise an extraordinary amount of care in selecting other melting stock...the purest of acid open hearth pig, of ore, and of fuel... likewise scarce and expensive ingredients.

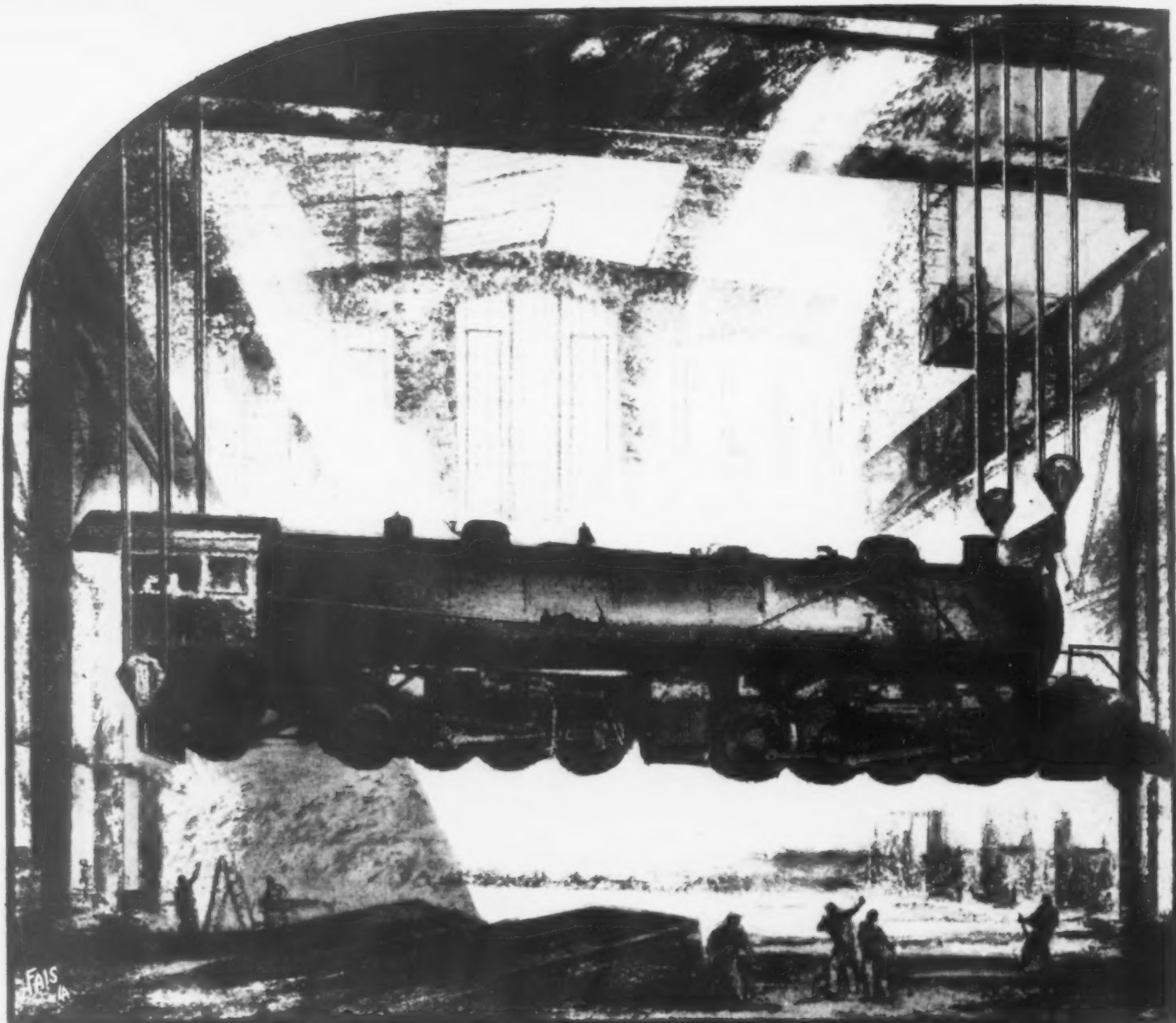
It takes more time and patience... this old-fashioned thoroughness... this close attention to details. *But it produces Roebling Wire Rope!*

ROEBLING



"BLUE CENTER"
STEEL

WIRE ROPE



Where *safety* is paramount!

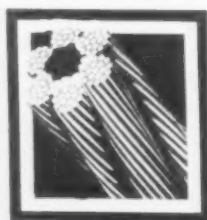
HOISTING AND LOWERING gigantic locomotives, each weighing several hundred tons, is a job on which no chances can be taken. A fortune is tied up in this costly equipment. Safety is paramount.

In rigging the Niles Locomotive Crane shown, installed in the shop of a southern railroad, the makers therefore left no stone unturned to assure its dependability. Only the most reliable of equipment was chosen . . .

including Roebling "Blue Center" Steel Wire Rope.

Throughout the Roebling mills, in every operation from "open hearth" to "reel", old-fashioned thoroughness is, and always has been the watchword. It supplements modern methods of production and adds that extra measure of service for which Roebling "Blue Center" Steel Wire Rope is noted.

ROEBLING




"BLUE CENTER"
STEEL

WIRE ROPE

JOHN A. ROEBLING'S SONS COMPANY
WIRE... WIRE ROPE... WELDING WIRE... FLAT WIRE
COPPER and INSULATED WIRES AND CABLES
TRENTON, N.J. Branches in Principal Cities

WASHBURN Wire



Piano Wire
Music Spring Wire
Clock and Motor Springsteel
Cast Steel Wire
Rope Wire
Paragon Wire
Shade Roller Wire
Flat Tempered and Untempered Spring Wires

Phonograph Needle Wire
Vanadium Wire
Round Spring Wire
Clock and Motor Springs
Cold Rolled Strip, 3" and narrower
Band Saw Wire
Flat Heddle Wire

WASHBURN WIRE CO., INC.

118 th St. & Harlem River New York, N.Y.

SPECIAL WIRE CLOTH

We produce special wire cloth for automobile oil, gas and air filters, wire netting for closed car tops and delivery bodies, and also special wire cloth for any other industry. Write us your specifications.

We also make Gray-Wick, Cortland, Wickwire Premier, Wickwire Bronze, Wickwire copper screen wire cloths, poultry netting and fencing, and hardware wire cloth.

Write your jobber for full information and prices.

**WICKWIRE
BROTHERS**
CORTLAND NEW YORK U.S.A.

DUPLICATION

One part exactly like another
—first and last of a million
—that makes for fast
assembly and low cost.

You get them with
Titchener-made
wire parts.

Staples,
wire forms
of all kinds.

E.H. TITCHENER & CO.
200-206 Walnut St., Binghamton, N.Y.

An Efficient Wire Rope for Heavy Duty



REG. U.S. PAT. OFF.

IT CAN BE RECOGNIZED BY ITS ONE RED STRAND, WHICH IS ALSO OUR GUARANTEE THAT ITS EXCEPTIONAL QUALITY IS CONSTANTLY MAINTAINED

Made only by

A. Leschen & Sons Rope Company, St. Louis, Mo., U.S.A.

New York

Chicago

Denver

San Francisco

Purchased repeatedly by shrewd buyers on the good old principle: "The best is the cheapest in the end."

BRODERICK & BASCOM ROPE CO.
New York ST. LOUIS Seattle N681

Yellow Strand WIRE ROPE

LEE-BUILT SPRINGS



All Sizes

LEE SPRING COMPANY, Inc.

30 Main St., Brooklyn, N. Y.

**WIRE
SHAPES**
of Every Kind

Hindley Mfg. Co., Valley Falls, R. I., U. S. A.

HUNTER
SPRINGS Any Type Any Metal

HUNTER PRESSED STEEL CO.
Lansdale, Pa.

**COILED
AND FLAT
SPRINGS AND
WIRE FORMS
OF ALL KINDS**

THE CLEVELAND WIRE SPRING CO.
CLEVELAND, OHIO

CUYAHOGA
SPRINGS and WIRE SHAPES

THE CUYAHOGA SPRING CO.
10250 BEREA ROAD CLEVELAND, OHIO
CHICAGO DETROIT BUFFALO

M. D. HUBBARD SPRING CO.

SOUTH SAGINAW AND JESSIE STREETS
PONTIAC, MICH.
ESTABLISHED 1905

COILED and FLAT SPRINGS
(Phosphor Bronze Springs a Specialty)
WELCH EXPANSION PLUGS
(For Closing Core Holes)
SPECIAL WIRE SHAPES SMALL STAMPINGS
WASHERS and SPRING COTTERS
Send blue prints or samples for estimates.
(CATALOG MAILED UPON REQUEST)

WELCH EXPANSION PLUG

HAZARD LAY-SET

*Lay-Set Preformed Wire Rope
spools perfectly. It winds on your
drum almost as tight running idle
as when under heavy load.*

SERVICE reports from every industry prove that preformed wire rope gives from 30% to 300% added service, over ordinary wire rope. Because of this, Lay-Set Preformed Wire Rope is used by operators interested in rope economy.

Our new "Book of Facts" fully explains the preforming principle, and why there are seven cardinal reasons for Lay-Set's increased service. You should have a copy of this book. Send for it—today.

**HAZARD WIRE
WILKES-BARRE**

New York Pittsburgh Ft. Worth Chicago Los Angeles



**ROPE COMPANY
PENNSYLVANIA**

San Francisco Denver Birmingham Philadelphia Tacoma



To
Sample
Blueprint
Specifications
All
Kinds of
SPRINGS
Flat and
Coiled
and
Wire Forms

American
Spring & Mfg. Corp.
Holly Michigan

Light and Heavy Dependable
SPRINGS



WE lay stress, not so much upon our modern automatic machines and appliances, but more particularly upon the knowledge gained by 37 years' experience in designing and manufacturing an infinite variety of springs, which, because of their design, heat treatment and uniform accuracy, invariably function properly in the products for which they are made.

This knowledge and experience we offer you as our most valuable asset in helping you efficiently and economically solve your spring problems.

What are your requirements?

AMERICAN SPIRAL SPRING & MFG. CO.
Established 1887
ARSENAL STATION PITTSBURGH, PA., U. S. A.

MILLER & VAN WINKLE, INC.

QUALITY



SERVICE

"SPRINGS"

PROPERLY-MADE
MAXIMUM-SERVICE

18 BRIDGE ST.

BROOKLYN, N. Y.



**THE CHAS. FISCHER
SPRING COMPANY**

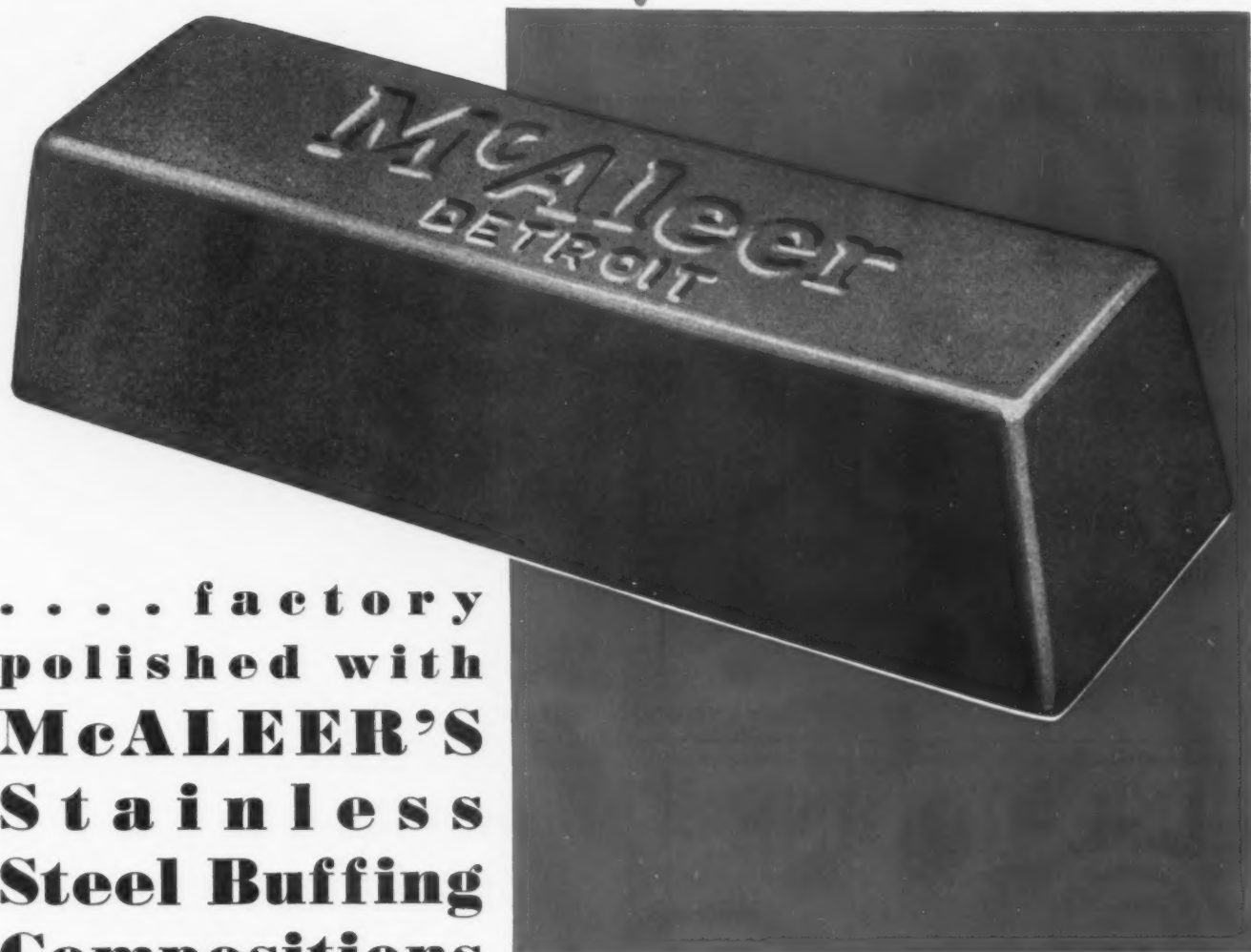
Round and Flat Springs, Wire Forms, Flexible
Shafts and Tubing, complete Mechanical Assemblies

242 KENT AVE. BROOKLYN, N.Y.

There is no more

profitable way for a man to
invest his time than to read
the journal of his chosen field.

AUTOMOBILE LAMPS AND RADIATOR SHELLS



**. . . . factory
polished with
McALEER'S
Stainless
Steel Buffing
Compositions**

For giving a brilliant, *permanent* polish to stainless steel or rustless iron, nothing is quite so satisfactory as McAleer's Stainless Steel Buffing Compositions.

The fact that the country's most prominent automobile and parts manufacturers use these new products in ever-increasing quantities is conclusive

evidence of their ability to do the job quickly and economically.

McAleer's Stainless Steel Buffing Compositions are available in three grades: No. 6, medium dry, for small parts; No. 7, medium greasy, for flat parts; and No. 7-F-170 (new development), for miscellaneous work. In requesting samples, please specify which compositions are desired.

**JOBBER'S
WANTED!**

**McALEER
MANUFACTURING COMPANY**

Lyndon and Prairie Avenues, Detroit, Mich.

S · P · E · E · D

in production is the result of each factor which contributes to the dependable performance of every production operation. Cleaning operations when performed with the use of the

Wyandotte

Metal Cleaners

are one of the most dependable units of a production schedule. This is because these unusual cleaners are so efficient in their action, and so dependable and uniform in quality that they turn out "chemically clean" metal at a speed which meets the most exacting schedule. By placing an order for Wyandotte Metal Cleaners you also reduce your rejections to a minimum.

THE J. B. FORD CO.

Sole Mfrs.

WYANDOTTE, MICHIGAN



Ask your
supply man
for

"WYANDOTTE"

USE RODINE

for

PICKLING

And Save at Least 30 Cts. Per Ton

AMERICAN CHEMICAL PAINT CO.

AMBLER, PA.

CHAMPION 401 STEEL RIVET FORGE

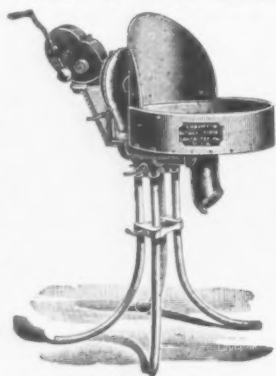
Made with adjustable Ball Bearings only.

Capacity 4" round iron in 10 minutes.

Hearth, 18 inches in diameter.

Fan Case, 9 inches in diameter.

*Turns Easy
Lasts Longer*



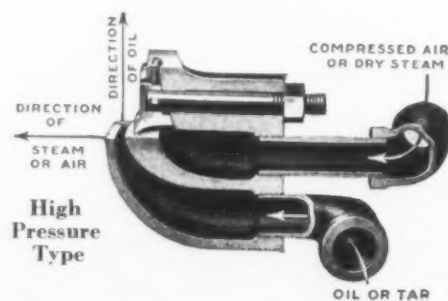
*Over a Million
in Use*

Write for No. 55 Catalogue on Blowers, Forges, Drills, Lathes, Grinders, Hack Saw Machines, Taps and Dies, Power Hammers, Ventilating Fans and Woodworking Machinery, etc.

CHAMPION BLOWER AND FORGE CO.—LANCASTER, PA.

Gives a flame to fit any firebox

W. N. BEST Oil Burners



The W. N. BEST Oil Burner is filed, fitted and tested to insure proper flame performance for each application. There are no internal parts or needle points to clog, and the burner is always clean. Regulation of the flame is very simple and assures great economy in operation.

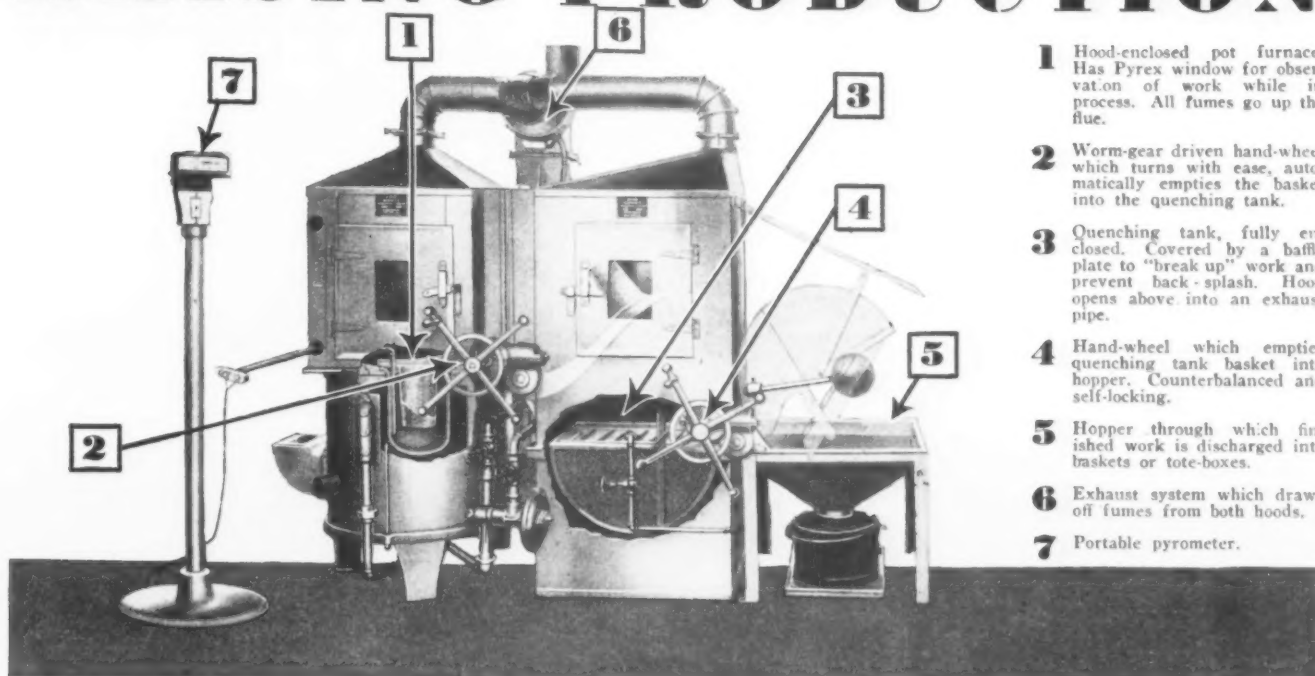
*Let us give you the benefit of thirty-nine years' experience in Liquid Fuel Combustion.
Catalog on request.*

W. N. BEST Corporation

295 Fifth Ave.

New York, N. Y.

RAISING PRODUCTION



- 1 Hood-enclosed pot furnace. Has Pyrex window for observation of work while in process. All fumes go up the flue.
- 2 Worm-gear driven hand-wheel which turns with ease, automatically empties the basket into the quenching tank.
- 3 Quenching tank, fully enclosed. Covered by a baffle plate to "break up" work and prevent back-splash. Hood opens above into an exhaust pipe.
- 4 Hand-wheel which empties quenching tank basket into hopper. Counterbalanced and self-locking.
- 5 Hopper through which finished work is discharged into baskets or tote-boxes.
- 6 Exhaust system which draws off fumes from both hoods.
- 7 Portable pyrometer.

in the Hardening Department

THE new Hyro Automatic Pot Furnace definitely increases production in the hardening department. But that is only one of its advantages. Here are some others:

Cuts labor cost. One man can easily tend two—or even more Hyro Automatic units. . . . *Turns out uniformly hardened work.* Each load travels from pot to quench in the same time and under identical conditions, therefore depth of case does not vary. . . . *Cuts out lifting and carrying of heavy loads.* Charge is mechanically conveyed into and out of the quenching tank. Workers do not slow down toward the end of the shift. . . . *Makes case-hardening SAFE.* There are no fumes, no possibility of burning and scalding, consequently hardly any labor

turnover because all danger to workers is eliminated. . . . *Materially reduces both fire and compensation insurance rates.*

How is it done?

The illustration shows clearly how the Hyro Automatic works. Pot furnace and quenching tank are combined into one unit. Both are completely enclosed by separate but connected hoods that are exhausted of noxious fumes by a powerful fan. The hoods are opened only for charging the pot (by hand) and for discharging the quench (automatically). Both hoods have Pyrex windows for observation of the work. A worm-gear driven, counterbalanced, self-locking hand wheel swings the heated charge through a sealed passage from the pot to the quench; a

similar hand wheel empties the quenching tank through the hopper into any convenient receptacle.

Find out what HYRO can do for you!

Find out how hardening production can be increased, your costs cut, and your working conditions greatly improved—with the Hyro Automatic. Send the coupon today for the complete story.

HYRO MANUFACTURING CO., Inc.
205 Varick Street New York City

10-30
HYRO MFG. CO., Inc.
205 Varick Street, New York City
Please send me the details of the Hyro Automatic Furnace.

Name

Address

City..... State.....

HYRO AUTOMATIC FURNACE

For Case Hardening and Tempering



O N C E
A L W A Y S



SURFACE COMBUSTION - CHAPMAN - STEIN

UNITE

... to serve the Steel Industry—better. Two organizations—each with high standing in its respective division of steel mill furnace engineering and construction—have united. By doing so—a complete engineering and manufacturing service on both roughing and finishing furnaces becomes available to the Steel Industry through one organization . . .



THE SURFACE COMBUSTION COMPANY

INCORPORATED

Subsidiary of Henry L. Doherty & Company

TOLEDO • OHIO

THE ANTHONY NEBULYTE OIL BURNING SYSTEM

A highly developed system of gas firing with oil fuel, 70,000 applications. Other systems quickly converted. Old burners easily replaced with NEBULYTE Oil and Gas burners. Installations everywhere.

THE ANTHONY CO. LONG ISLAND CITY, N. Y.

HAUCK VENTURI LOW PRESSURE OIL BURNERS

Combination Venturi-triple atomization—for hot and cold air Super Venturi—adjustable for straight or rotary flame

Both types burn all light and heavy fuel oils. Ideally suited to automatic temperature controls. Write us about your oil burning problems. We have and will recommend a burner to meet your requirements.

Hauck Mfg. Co., 128—10th Street, Brooklyn, N. Y.

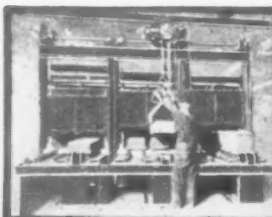
ROCKWELL FURNACES ELECTRIC and FUEL

W. S. ROCKWELL COMPANY



NEW YORK
DETROIT

CHICAGO
MONTREAL



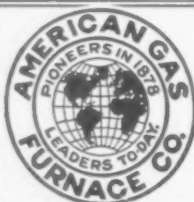
Carburizing FURNACES

Heat Treating Furnaces for every purpose.

Send for Bulletin

The Electric Furnace Co.
Salem, Ohio

Exclusively Electric HEVI-DUTY Heat Treating Furnaces HEVI-DUTY ELECTRIC CO. MILWAUKEE, WISCONSIN



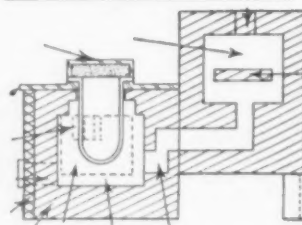
Equipment for Hardening, Annealing, Casehardening, Tempering, Coloring, and for All Industrial Heat Treating Operations. Bulletin I.A. 20 on request.

American Gas Furnace Co.
Elizabeth, N. J.

Designed for Every Heat

ECONOMY SALT BATH FURNACE

Treating Service



"Every Arrow Shows a Feature"

Make your salt bath heat treating a definite success by using the proper furnace.

Economy Salt Bath Furnaces are built with round and rectangular containers for any capacity. Ask us, without obligation, to recommend the proper type and size, best suited to your work.

Send for new Bulletin No. 6.

THE ECONOMY FURNACE COMPANY
CHICOPEE, MASS.

SC&H Furnaces are built in all sizes of Oven, Pot, Continuous, and Special Types for Electric, Oil or Gas application.

STRONG CARLISLE & HAMMOND

1400 W. 3rd St. Cleveland, O.

SC&H Furnaces are made for annealing, case hardening, carburizing, forging, cyaniding, lead hardening & oil tempering.

"American" Electric Furnaces for every industrial purpose

Pot Type Box Type High Speed Rotary Hearth
Rotary Retort Continuous and semi-continuous

AMERICAN ELECTRIC FURNACE CO.
31 Von Hillern Street, Boston, Mass.

DETROIT ROCKING ELECTRIC FURNACES

USED BY THE FOREMOST FOUNDRIES

ROLLING MILLS, SMELTERS AND REFINERS

Detroit Electric Furnace Co. DETROIT, MICH.
825 W. Elizabeth St.



Moore Rapid Section Melt Furnaces

Ten Standard Sizes 1/2 to 24 Tons Capacity
Most Rapid and efficient for making
Tool Steels, Alloy Steels, Forging Steels,
Steel Castings, Malleable Iron & Gray Iron
PITTSBURGH ELECTRIC FURNACE CORPORATION
P.O. BOX 1125, PITTSBURGH, PA.

HOLCROFT & COMPANY



LEADERS IN BUILDING AND DESIGNING ELECTRIC AND COMBUSTION FURNACES, KILNS AND OVENS.
HOME OFFICE: DETROIT—BRANCHES: CHICAGO, PHILADELPHIA
CANADA: HIRAM WALKER & SON, METAL PRODUCTS, LTD., WALKERVILLE, ONT.



HAGAN

INDUSTRIAL FURNACES

for all purposes

GEORGE J. HAGAN CO.
PITTSBURGH, PA.

New York Detroit Chicago San Francisco



FURNACES FOR METAL WORKING



Bellevue No. 16 for Heat Treating, Case-hardening, and Annealing; Oil or Gas-fired; 50 Standard Sizes to Select From

THE illustration represents but one of the many types of Bellevue Industrial Furnaces especially designed for metal workers.

During the past 20 years we have furnished equipment for . . .

Melting . . . Billet Heating . . . Case Hardening . . . Enamelling . . . Forging . . . Laboratory Work . . . Tempering . . . Pipe Bending . . . Annealing . . . Carburizing . . . Cyaniding and Brazing.

We are able to meet any requirement for furnaces; either gas, oil or electric heat. Manufacturing our own refractory materials we are in position to guarantee non-shrinking linings. Our furnaces are widely used and universally endorsed.

Complete catalog on request.

Special furnaces designed and built to order.

BELLEVUE

INDUSTRIAL FURNACE COMPANY
DETROIT



GEHRICH
INDUSTRIAL
OVENS

For Improved Performance

EMPLOYING ALL MODERN CONVEYING METHODS

JAPANNING. ENAMELING. CORES AND MOLDS. VARNISHED INSULATIONS. LOW TEMPERATURE HEAT TREATING. MANY OTHER APPLICATIONS. ACCESSORY EQUIPMENT.

Write for descriptive literature

GEHRICH OVEN COMPANY

SKILLMAN AVE. and 35th ST.
LONG ISLAND CITY, N.Y.
Branches in Principal Cities

GAS
ELECTRIC
OIL
STEAM



DRY-SYS
EQUIPMENT
CHICAGO, ILL.
U.S.A.

DRY-SYS Equipment includes:

Finishing Room Equipment for all wood and metal products; Drying and Baking Ovens with trucks, racks, conveyors, washers, etc.; Foundry Core Ovens; Dry Rooms for high or low temperature; Air Conditioning Equipment; Industrial Furnaces; Heating Units for gas, oil or steam.

Descriptive literature on request.

DRYING SYSTEMS, INC.
1813 Foster Ave., Chicago, Illinois

INDUSTRIAL OVENS


YOUNG BROTHERS COMPANY

DETROIT MICHIGAN

INDUSTRIAL FURNACES
ELECTRIC FURNACES COMBUSTION FURNACES
HEAT TREATING AND ANNEALING FURNACES

SWINDELL-DRESSLER CORPORATION
P.O. BOX - 1753 PITTSBURGH, PA.

DRESSLER CONTINUOUS FURNACES
BLAST FURNACE PRESSURE BURNERS
PRODUCER GAS BURNERS



TRADE MARK
BRISTOL'S
REG. U.S. PAT. OFFICE

Recording, Indicating and Control Instruments for temperature, pressure, liquid level, speed, motion, etc. Controller Valves for oil, gas, electricity. Engineering service free. Write for catalogs.

THE BRISTOL CO., Waterbury, Conn.

Warning Signals against rising costs



Has slow business slowed down your machine operators and raised the cost of their output? Then raise the signals against slack work; show that "depressed" production is no longer enough. . . Veeder-Root Counters will point out accurately the production you OUGHT to get from each machine. And check up what you DO get. They'll adjust your men to the new activity which calls for quickened work, continuously RECORDED. Ask for our Catalogue of the RECORD-makers!

OFFICES IN THE
PRINCIPAL CITIESVeeder-ROOT INCORPORATED
HARTFORD, CONN.BUILDERS OF COUNTERS
FOR EVERY PURPOSE

IN HARDNESS TESTING

After twenty years, the hard work of the world is still done with

The SCLEROSCOPE

(International Standard)

Yields a Nondestructive Test



100% portable and can be carried to the job. Direct Reading can be operated by anyone with great rapidity. Measures softest metals and hardest steels without special adjustment. Comparatively inexpensive.

FOR STATIC PRESSURE HARDNESS TESTING we also make the Monotron which yields Qualitative and Quantitative values, also testing superhard materials up to over 2000 Diamond Brinell. No setting to Zero—Unrivalled for Speed.

Send for our free literature.
Localcase and Localhard for Selective HardeningThe Shore Instrument & Mfg. Co.
Van Wyck Ave. & Carll St., Jamaica, New York
Agents in All Foreign Countries

Power, Electrical, and Industrial Machinery

Steam and Hydraulic Turbines • Steam Engines

Motors • Generators • Transformers • Switchgear

Centrifugal Pumps • Tensile Drives • Tractors

Crushing, Gravel, Mining, Flour Mill and Saw Mill Machinery

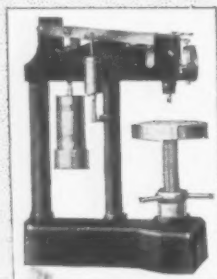
ALLIS-CHALMERS MFG. CO.

MILWAUKEE, WIS., U. S. A.

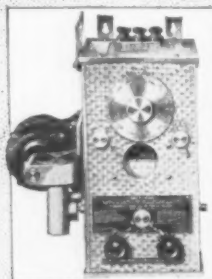


De Laval

Steam Turbine Co., Trenton, N.J.

514 Turbines for all speed and steam conditions.
Catalog D42. Double Helical Speed Reducing Gears.
Catalog G42. Centrifugal Pumps, for all capacities.
Catalog B42. Centrifugal Blowers and Compressors.
Catalog F42. Worm Gears, Catalog R42. Flexible
Couplings. Catalog K42. Water Wheels. Catalog W42.

ROCKWELL
Hardness Tester

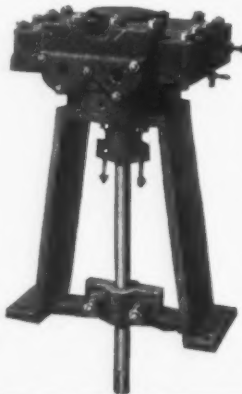
Send
for
Catalogs

PYROMETER
Controller, Indicator and Recorder
Both millivoltmeter
and potentiometer types.

728 East
143rd St.

WILSON-MAEULEN CO. New York
INCORPORATED

Vertical Frame Air Motors

for Agitators, Mixers,
Submerged Pumps, orOther installations where vertical shaft
is required. Furnished in non-reversing
type with either right hand or left hand
rotation. Also reversing type. Sizes
2 H.P. to 30 H.P.

DAKE Air Motors

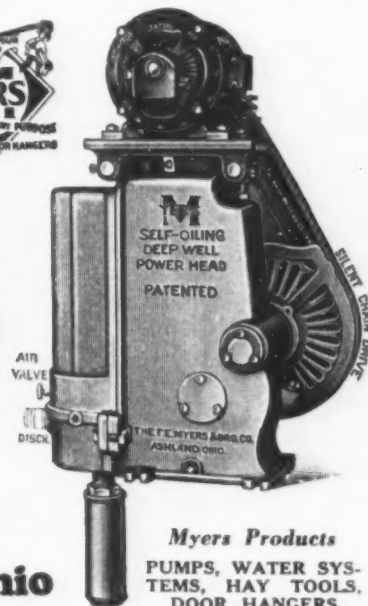
Have No Dead Centers

They start, stop and reverse instantly.
Require no expert attendance and give
lasting satisfactory service. Catalog on
request.

DAKE ENGINE COMPANY
Grand Haven, Mich., U. S. A.

MYERS SELF-OILING POWER PUMPS FOR GENERAL SERVICE

Designed by pump engineers of long experience, built by pump experts of long experience in a modern pump factory, Myers Self-Oiling Power Pumps in styles and sizes for service up to ten thousand gallons of water per hour, have a world wide sale through thousands of reliable dealers and distributors. If you have water problems to solve at your country or suburban home, at your summer cottage or camp, at your mill, mine or factory, or any other place where dependable water service is essential, write us for a copy of our late catalog and complete information, or visit our nearest dealer, whose name we will be glad to give you on request.



THE F. E. MYERS & BRO. CO., Ashland, Ohio
ASHLAND PUMP AND TOOL WORKS

Myers Products

PUMPS, WATER SYSTEMS, HAY TOOLS, DOOR HANGERS

MORRIS

Since 1864 we have been building Centrifugal Pumps, Hydraulic Dredges and Steam Engines. You can depend on all Morris equipment.

MORRIS MACHINE WORKS
BALDWINVILLE, N. Y.
Agents in Principal Cities



CENTRIFUGAL PUMPS

BURY AIR AND GAS COMPRESSORS VACUUM PUMPS

ALL SIZES, ALL TYPES, ALL PRESSURES TO MEET ANY ENGINEERING REQUIREMENTS
BURY COMPRESSOR CO., 1706 Cascade St. ERIE, PA.

ROTURBO CENTRIFUGAL PUMPS

Manistee Iron Works Co., Manistee, Michigan

FELTS for every conceivable purpose—

Washers, Gaskets, Wicks, Pads, Strips, for lubricating, dustproofing, insulating, etc.

THE BOOTH FELT CO., Inc.

477-79 19th St. BROOKLYN, N. Y. 734 Sherman St. CHICAGO, ILL.

AIR COMPRESSORS
GAS COMPRESSORS
VACUUM PUMPS
CENTRIFUGAL PUMPS
BOILER FEED PUMPS

PENNSYLVANIA

PUMPS & COMPRESSORS

PENNSYLVANIA PUMP & COMPRESSOR CO.
MAIN OFFICE AND WORKS: EASTON, PA.

FELT for EVERY PURPOSE

All colors and styles, by piece, yard, etc., or cut to special shapes to meet your requirements.

Washers, Gaskets, Discs, Wicks, Strips, etc.

for Mechanical, Electrical, Automobile and other trades.

CONTINENTAL FELT CO.
890 BROADWAY, NEW YORK



HIGH PRESSURE VALVES and FITTINGS. Hydraulic Machinery.

ANKER ENGINEERING CO.
Widener Bldg. Philadelphia

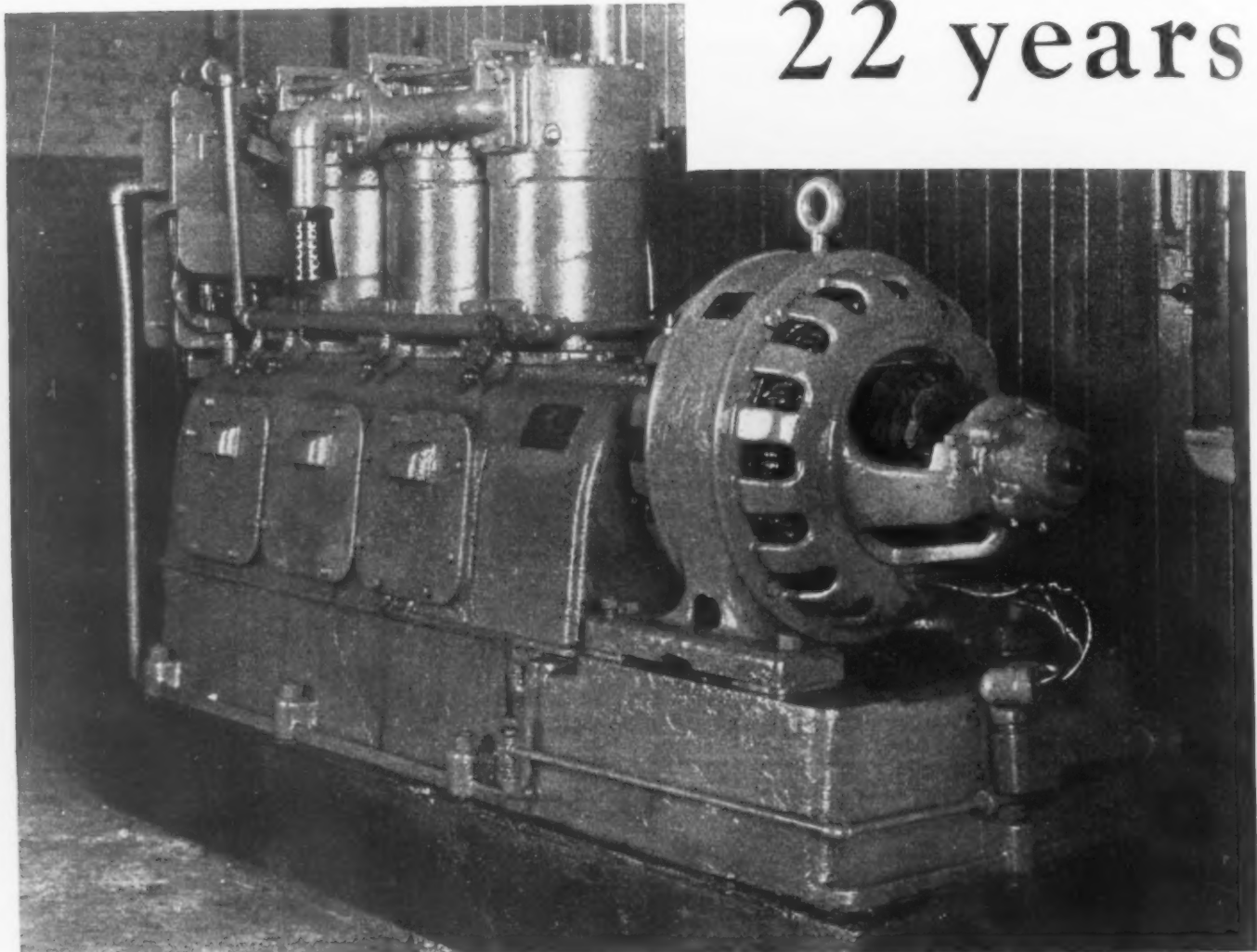
FELT

manufactured and cut to exact specifications, 3 large factories, a cutting plant and nine branches; the utmost in service. Blue prints—specifications—samples, send us one or all of them. We will then submit quotations and advise you of any savings that might be effected.

The FELTS Co., Inc. Manufacturers of Felts

Boston New York Chicago Detroit St. Louis
Philadelphia Cleveland Los Angeles San Francisco

A Veteran Still in Service After 22 years



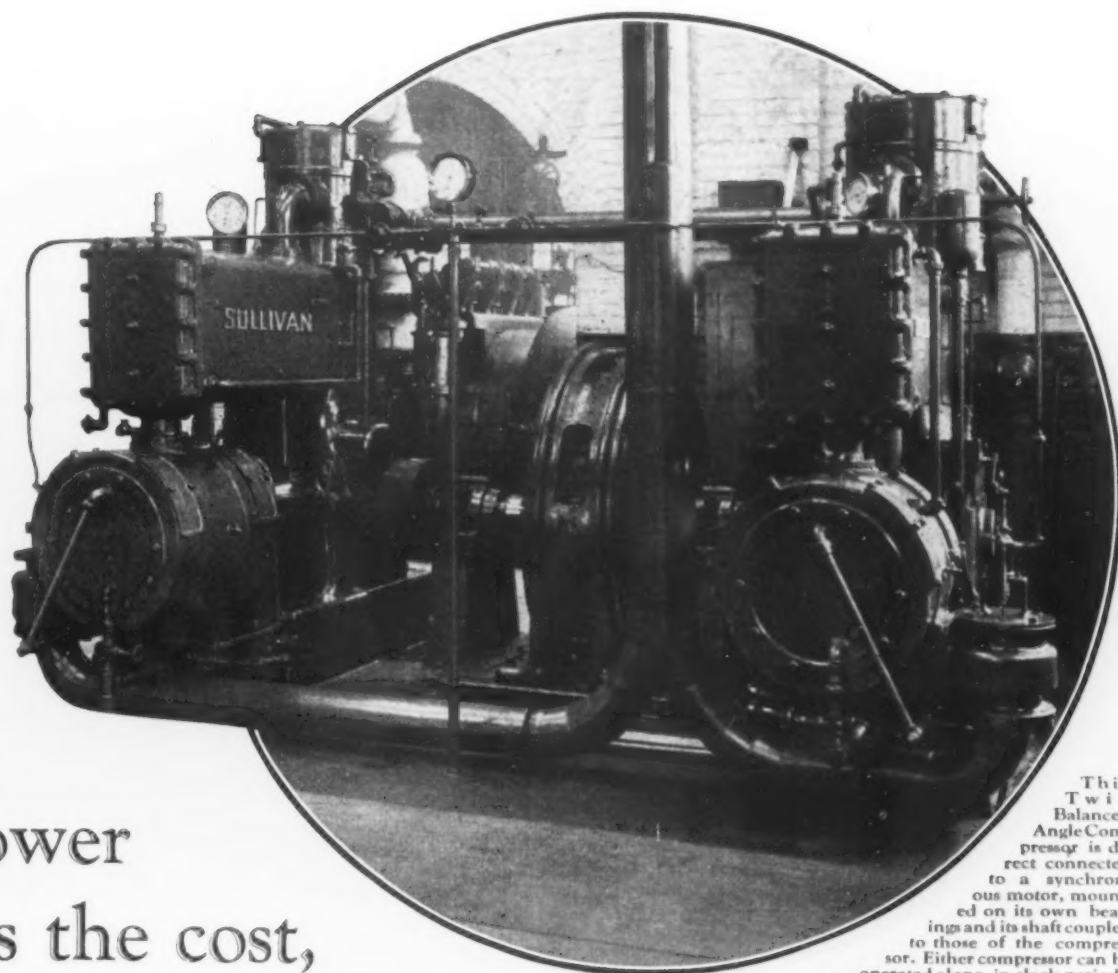
The illustration shows a type 3VS-11 compressor, 100 cu. ft. installed in 1908 and used continuously for car charging, cleaning, and operation of pneumatic tools . . . Westinghouse-National air compressors are made in many types and sizes ranging from 2½ to 700 cu. ft. displacement. Where dependability is vital they are performing with distinction—"Quality Machines for Quality Service."

WESTINGHOUSE-NATIONAL air compressors are noted for their long trouble-free service . . . Leading manufacturers, by hundreds of outstanding cases, have proved they are unexcelled for reliable and economical operation . . . The machine illustrated was installed by a well-known eastern railroad 22 years ago. Since then additional compressors of similar type have been purchased for other parts of the system, on an average of one each year . . . All of the 23 machines are "running true to form."

Westinghouse Traction Brake Company

General Office and Works: Wilmerding, Pa.

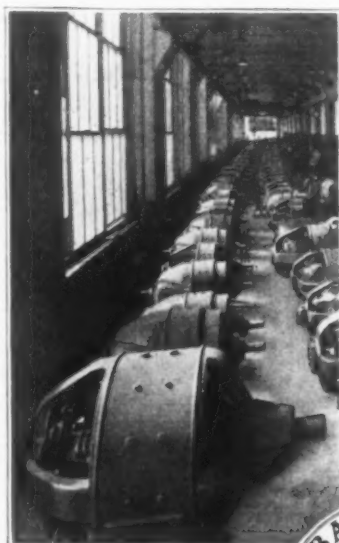
WESTINGHOUSE-NATIONAL *Air Compressors*



This Twin Balanced Angle Compressor is direct connected to a synchronous motor, mounted on its own bearings and its shaft coupled to those of the compressor. Either compressor can be operated alone, in slack periods.

air power cuts the cost, and electricity serves new millions

Balanced Angle Compressors increase profits for Builders of 2/3 of America's electrical equipment



A cost cut on an electrical product may bring a million customers. A million new buyers in industry—or a million new families who wash, iron, sew, clean, refrigerate, or exercise, electrically.

Production processes and machines set the growth of the electrical industry. They are adopted, when they prove they can cut costs.

—and today, builders of two-thirds of America's electrical equipment use air power from Balanced Angle Air Compressors.

In the plant illustrated, two twin Balanced Angle Compressors were bought first. Then a third, a fourth, a fifth, followed in quick succession.

While air proved its economy on a swiftly-growing list of uses—Balanced Angle Compressors proved their economy in power, maintenance, and floor space.

They have proved their economy to leaders in every industry. They will prove it to you.

Why not send now for catalog 83-J?



S U L L I V A N

Sullivan Machinery Company

821 Wrigley Bldg., Chicago

The New Wood SB-10 Type GAS PRODUCER



embodies the latest developments in full mechanical gas producers. It has proven its *reliability* during nine months of continuous operation under the most trying load conditions requiring the *best performance* of a gas producer.

We will be glad to have our engineers call upon you to give full information regarding the details of construction and performance of this machine and arrange for its inspection in actual operation.

The main features of the Type SB-10 Gas Producers are:

1. Full mechanical operation from the feeding of coal to removal of ashes.
2. Positive agitation of fuel bed by means of a single straight poker bar.
3. A water sealed, mechanical coal feeder without metal to metal contact between stationary feeder housing and multiple pocket feeder drum.
4. A revolving ash pan supported by accessible conical rollers.
5. An adjustable ash plow permitting continuous plowing of ashes regardless of the amount of coal gasified.
6. A noiseless turbo fan blower insuring greatest economy in steam consumption, and perfect control of blast saturation.
7. Self-supporting construction.
8. A simple driving mechanism for continuous rotation of shell and agitating bar.
9. A simple layout of producer foundation requiring only about 15 cubic yards of concrete.

HYDRAULIC
MACHINERY
& OPERATING
VALVES

R.D. WOOD & CO.
ESTABLISHED 1803

PHILADELPHIA, PA.

CAST IRON
PIPE, HYDRANTS
AND
VALVES

use AIR?

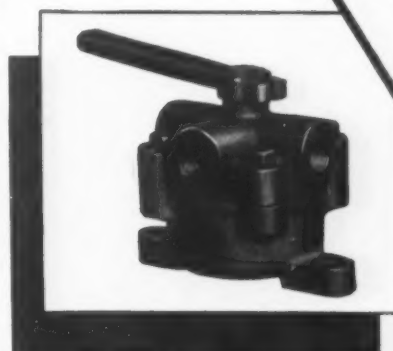
Eliminate Air Leaks with NOPAK Valves

WHEREVER compressed air is used NOPAK shut-off and operating Valves are necessary. For riveting, chipping, spraying, lifting, molding, mixing and dozens of familiar daily jobs NOPAKS will save time, power and money.

NOPAKS will hold air under compression longer than any other Valve made. Valve seats protected at all times. Discs definitely sealed whether Valve is closed or in operating position. Easy to operate. Permits throttling. No packing. No tapered plugs.

Here are a few of the many users who gladly recommend NOPAKS: American Steel Foundries, Chicago, Ill., Bucyrus-Erie Co., So. Milwaukee, Wis., Carnegie Steel Co., Pittsburgh, Pa., Fisk Rubber Co., Cudahy, Wis., B. F. Goodrich Co., Akron, O., Marion Steam Shovel Co., Marion, O., A. O. Smith Corp., Milwaukee, Wis., Waukesha Motor Co., Waukesha, Wis., Youngstown Sheet & Tube Co., Youngstown, O.

Write for facts that have made NOPAKS popular. Ask about the FREE test offer.



NOPAK Valves are made for air, water, gas, oil and other fluids. In straightway, 3-way and 4-way styles. All standard sizes from 1/4" to 2" pipe openings. Special sizes and port arrangements available on request.

GALLAND-HENNING

MANUFACTURING COMPANY

2743 So. 31st Street

Milwaukee, Wis. Offices in Principal Cities

In Chile's Most Modern Copper Producer—

Thousands of Square Feet of MITCO Interlocked Steel GRATING

IN design and construction, in the use of only the most efficient machinery and equipment, the mill of Andes Copper Mining Company at Potrerillos is outstanding as Chile's most modern copper producer.

Where this plant required open steel flooring, Mitco Interlocked Steel Grating was specified. Approximately 4,000 square feet of Mitco Grating are installed on the runway alongside the leaching vats.

Mitco Interlocked Steel Grating meets every requirement of the ideal open flooring. 90% of the panel area of Mitco is open area, thus providing maximum light and ventilation. Furthermore, Mitco is non-slipping and non-clogging, while its unique lock joint (no rivets, no bolts nor welding) assures tight, strong flooring through years and years of service.

Wherever you need open steel flooring, specify Mitco—the grating with every advantage. Write for bulletin.



Your old, worn floors can be made new and more durable without entirely replacing the floor and without excessive cost. Simply chip off the surface to the rough base, lay Mitco Armorgrids, and pour the fill into the Armorgrid mesh. Mitco Armorgrids make floors shock-proof and longer-lasting. Write for booklet.



Mitco Grating installed along the leaching vats in the plant of Andes Copper Mining Company, Potrerillos, Chile.

HENDRICK MANUFACTURING COMPANY

42 Dundaff Street, Carbondale, Pa.

New York Office: 15 John St. 'Phone: Cortlandt 2440

Pittsburgh Office: Koppers Bldg.

Baltimore, Md.
Birmingham, Ala.
Boston, Mass.
Charleston, W. Va.

Chicago, Ill.
Cleveland, Ohio
Detroit, Mich.
Erie, Pa.

Hazleton, Pa.
Houston, Tex.
Indianapolis, Ind.
Los Angeles, Cal.

Montreal, Can.
Philadelphia, Pa.
San Francisco, Cal.
Seattle, Wash.

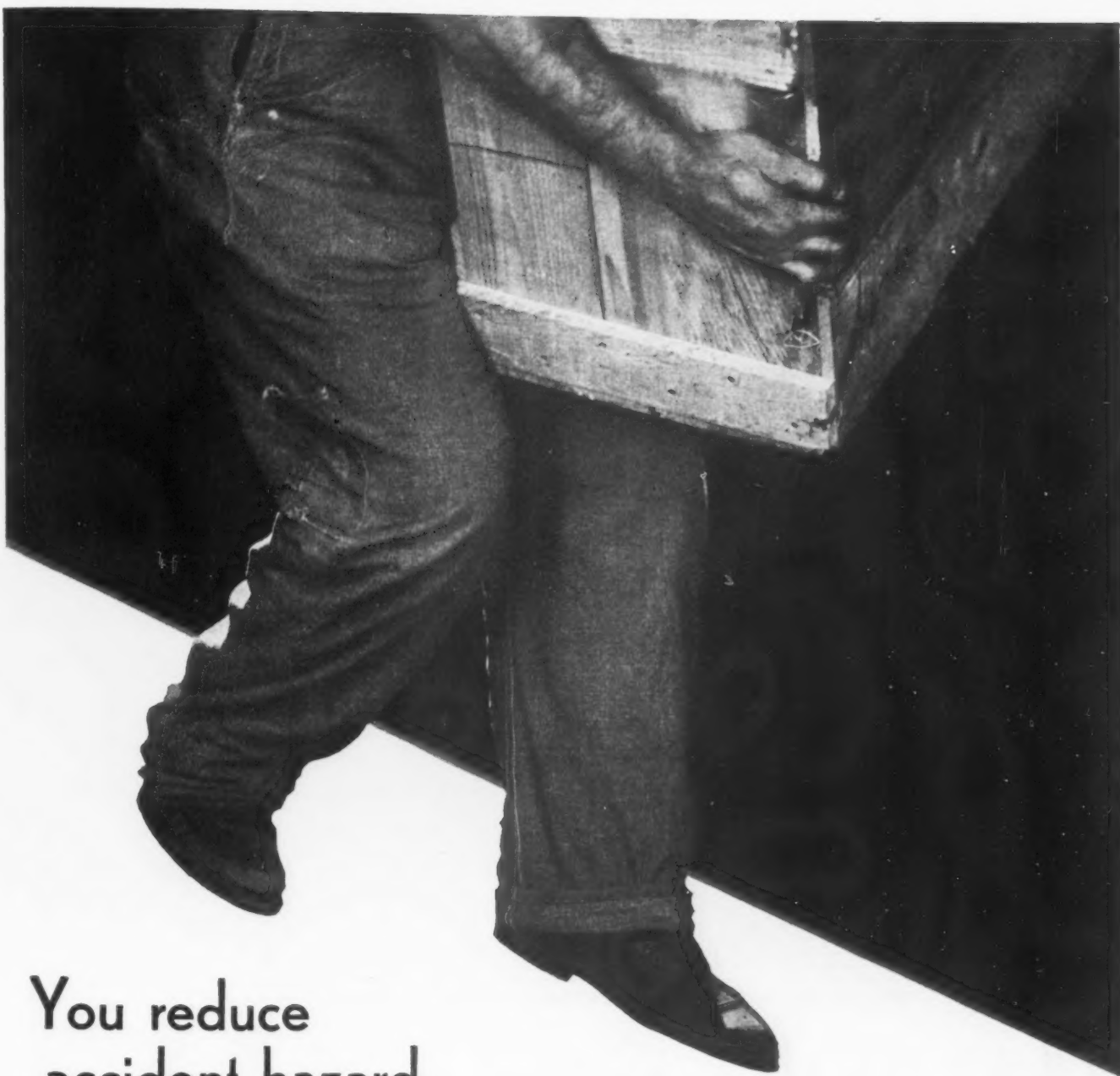
Tulsa, Okla.

Makers of Mitco-Shur-Site Treads, Hendrick Perforated Metal Screens and Elevator Buckets of all types

MITCO Interlocked Steel GRATING

The Grating with Every Advantage

High Strength—Permanent Rigidity—Non-Slipping, Non-Clogging Surface—Maximum Light and Ventilation



You reduce accident hazard ... with this **SLIP-SAFE** Floor

ADDRESSING the Eighteenth Annual Safety Congress, Mr. M. J. Mullen, of the Nekoosa-Edwards Paper Co., Port Edwards, Wis., stated that "J-M Industrial Flooring is the best type of floor where water is used for cleaning—it is not slippery when wet."*

Every plant manager and superintendent must realize the importance of this because at the same meeting the startling fact was presented that in one period, 18,092 falls, causing 220 deaths and 2,676

*The Paper Industry—October, 1929

cases of permanent injury were recorded. 48% of these were the result of falls on slippery floors. Floors were shown, therefore, to be the first point of attack against avoidable accidents.

Many of these accidents never would have happened if J-M Industrial Flooring had been there to guard against them.

In addition to safety, this floor has other important advantages. It is smooth and wear-proof—forming a monolith into the far corners—water-tight, fire-resistant and

always free of ruts and holes. J-M Industrial Flooring is a "made to order" floor. Its composition is varied to meet special conditions in your plant—tough but resilient for heavy traffic—or softer for the tread of feet. In foundry or office, in machine shop or chemical room, it resists every use and abuse which tends to injure it.

An interesting booklet has been prepared to describe, in detail, how this floor can prevent accidents, save money and provide more efficient and healthful working conditions everywhere. Send for it.



Johns-Manville

INDUSTRIAL FLOORING

Address **JOHNS-MANVILLE**

At nearest office listed below

New York Chicago Cleveland San Francisco Toronto
(Offices in all large cities)

Please send me a copy of the J-M Industrial Flooring booklet
—"What More Could You Expect of a Floor?" B-98

Name..... 1F-31-10

Address.....

The Perfect Diamond



The best "traction test" and what it Proves

NEVERSLIP

The best "traction test" for floor plates is actual service—and NEVERSLIP PERFECT DIAMOND FLOOR PLATES have been used for over 30 years. We are pioneers in the manufacture of this type of floor plate, and the traction test proves beyond question the worth of NEVERSLIP for Shop Flooring, Landings, Platforms, Runways, Fire Escapes, Vehicle Running Boards, Yard Traffic Plates, etc. Send for Samples and Literature. They will reach you promptly.

AMERICAN PRESSED STEEL
Commercial Trust Building—Philadelphia—Penn.

The Mark of a Pioneer

HOGGSON BRAND
HAND CUT
STEEL STAMPS
FORMERLY "YALE BRAND"



The life of a stamp depends on the correct shaping and proper tempering.

Try the
Hoggson Brand
for stamps or
Marking Dies
of all kinds.

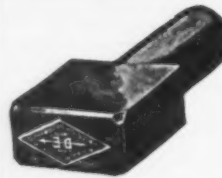
The Hoggson & Pettis Mfg. Co.
New Haven, Conn., U. S. A.

STEEL STAMPS
HAND CUT STEEL LETTERS and FIGURES
STENCILS—BURNING BRANDS
TOOL CHECKS—SEALS




THE SCHWERTLE STAMP CO.
39-45 CANNON ST. EST. 1879
BRIDGEPORT, CONN.
Send for Catalog

They're a work of art



Noble and Westbrook Engraved Roll Steel Dies and Press Stamps are made of the best quality steel by skilled workmen. You'll appreciate their artistic effect when you use them. Get the particulars.

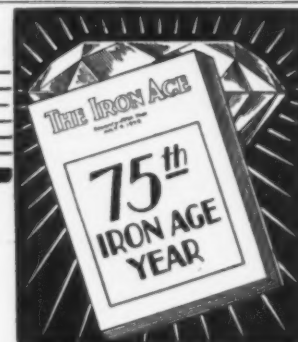
The Noble & Westbrook Mfg. Co.
Manufacturers of Rapid Production Marking
Machines, Machines for Automatic Numbering
on Metal, Steel Stamps, Brass Checks, etc.
Hartford, Connecticut, U. S. A.

MAYBE it's in the

CLASSIFIED SECTION...

If you can't find it in the regular advertising pages of The Iron Age—look in the Classified Sections at the back of this book.

THE CLASSIFIED SECTIONS
of THE IRON AGE





CARNEGIE FLOOR PLATE

Section M-41

Thickness— $\frac{3}{8}$ " to $\frac{3}{4}$ " exclusive of raised figure.

Width —6" to 66".

Weight —8.8 to 31.7 pounds per square foot.

Recommended for floors, sidewalk openings, stair and traffic treads, where a safe, secure foothold is required. This design drains and cleans easily.

CARNEGIE STEEL COMPANY

Subsidiary of United States Steel Corporation

PITTSBURGH, PA.

15



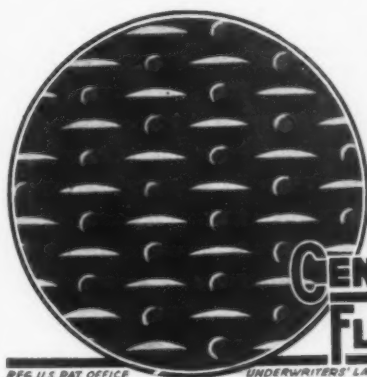
THE PRESIDENT SAYS.....

"One of our foremost policies has always been to make our plant a safe place in which to work."

"One of the big factors in maintaining this policy has been the Central Floor Plate."

"It prevents slipping."

This plate will do the same for you!



CENTRAL IRON & STEEL CO

Harrisburg, Penna.

Offices in all principal cities

If interested, send for sample and more detailed information on

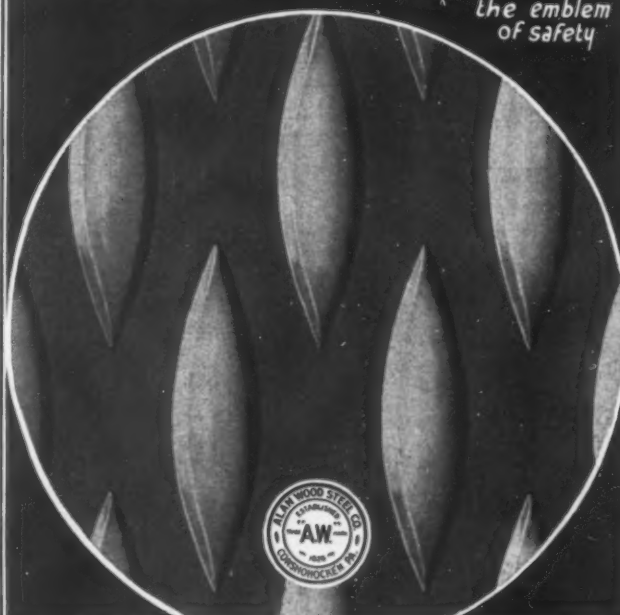
CENTRAL "KNOBBY" NON-SKID FLOOR PLATES

REG. U.S. PAT. OFFICE

UNDERWRITERS' LABORATORIES INSPECTED S.A. 443

"A.W." DIAMOND PATTERN FLOOR PLATE...

the emblem of safety



ALAN WOOD STEEL CO.

Conshohocken, Pa.

Philadelphia
Seattle

New York
San Francisco

Boston
Los Angeles

Century Wood Preserving Co. SERVICE

All forest products treated with
all standard preservatives by
all standard processes

Address Inquiries to Nearest Office

Pittsburgh—The Ohio Wood Preserving Co.; Pittsburgh Wood Preserving Co., Koppers Bldg.; The Maryland Wood Preserving Co.

Philadelphia—Delaware Wood Preserving Co., Finance Bldg.

Boston—New England Wood Preserving Co., Chamber of Commerce Bldg.

New York City—Delaware Wood Preserving Co., 30 Church Street.

Reed City—Michigan Wood Preserving Co., Reed City, Michigan.

KREOLITE FLOORS



"Outlast the Factory"

An excellent investment for machine shops, warehouses, foundries, pickling rooms and other parts of the plant where the floors receive hard wear. Write today for our booklet "Factory Floors."

THE JENNISON-WRIGHT CO., 80 Kreolite Bldg., Toledo, O.

WASHING MACHINES for METAL PARTS

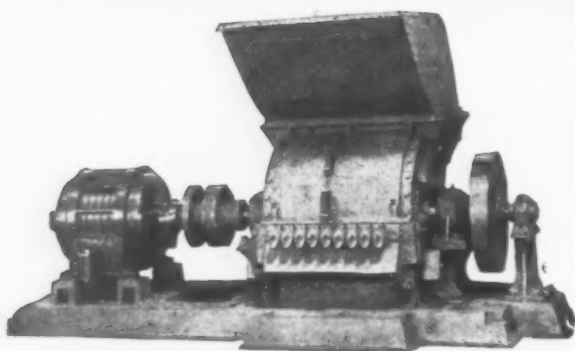
DRYING OVENS

Enameling--Baking--Lacquering Ovens

DETROIT SHEET METAL WORKS

1298 Oakman Blvd.

Detroit, Mich.



No. 3800 American Steel Turnings Crusher with hopper mounted on bed plate. (Patented.)

American Ring Crushers are crushing run of mine coal to stoker size at maintenance cost as low as 1/10 of a cent a ton.

Do You Get TOP PRICE for Your Turnings?

Long turnings are not only harder to handle, but they require more storage space and bring a low price.

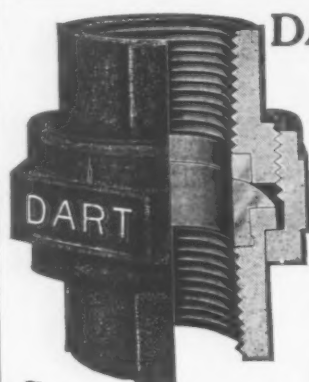
An American Ring Crusher will simplify handling by reducing long chips into shovel-size chips which require less storage space—lower shipping costs—enable you to find a ready buyer and get top price.

Let us give you some interesting facts and figures. You will not be obligated.

ORIGINATORS OF THE ROLLING RING CRUSHER PRINCIPLE

American Pulverizer Co., St. Louis, Mo.

1249 Macklind Avenue



DART UNIONS

Two bronze-to-bronze seats accurately machined and carefully ground give double protection to the joint. Pipe ends and nut are heavy high grade malleable iron. Write for new price list and sample.

The Fairbanks Company, Sales Agents
Canadian Factory: Dart Union
Limited, Toronto

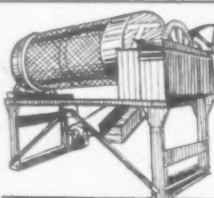
E. M. Dart Mfg. Co.
Providence R. I.

To Responsible parties, samples on request.

There's More Money in Crushed Turnings

The American Chip Crusher will reduce yours so economically and bring about such savings in oil, labor, space and shipping costs, that it will pay for itself in a few months. Write us for full particulars.

AMERICAN CRUSHER AND MACHINERY CORP.
853 Broadway, New York, N. Y.



Rotary Screens

Made in sizes and with drive equipments to suit individual requirements. Write for catalog of complete sand and mold handling systems.

The Beardsley & Piper Company
2541 North Keeler Avenue, Chicago

LOOKING FOR SOMETHING THAT'S HARD TO LOCATE?

Want to buy used machinery? Looking for somebody's surplus materials at reduced cost? Want to buy a factory building? Going to add a salesman or production man to your staff? Thinking about letting out some machine work on contract? Then thumb through the pages of the Classified Sections in the back of this book where these and other special services are advertised.

THE CLASSIFIED SECTIONS
of THE IRON AGE

After 26 YEARS

THESE 115 KINNEAR AUTOMATIC FIRE SHUTTERS
ARE AS GOOD AS THE DAY THEY WERE INSTALLED



Although intended primarily for fire protection, the doors and shutters on the first floor are lowered every night to prevent unlawful entrance, and those on the wall are used, in the summer, instead of awnings.



The new Kinnear Rolling Door Catalog is mailed free on request. Kinnear Engineering and Estimating Service is available without charge or obligation.

Kinnear

ROLLING DOORS

Twenty-six years is quite a spell—a lot of water goes over the miller's wheel in a quarter of a century. Comparatively few mechanical devices made that long ago are in perfect operating condition today. But that's the habit of Kinnear Rolling Doors and Shutters. Ten, twenty, thirty years of perfect, uninterrupted service is the rule, not the exception. They just seem to mellow with age and, if anything, work a little smoother as time goes on.

Such performance doesn't just happen. It's the result of the extra generous factor of safety that is standard in Kinnear Engineering. Naturally, Kinnear Doors cost a little more at the start—but a lot less at the finish.

THE KINNEAR MANUFACTURING CO.
817-867 Field Avenue, Columbus, Ohio, U. S. A.

Boston Chicago Cincinnati Cleveland Detroit New Orleans
New York Philadelphia Pittsburgh Kansas City Washington

GUARANTEED MANUFACTURED (ORIGINATED BY US) MACHINE TOOLS PRICES LOW

LATHES

- 1-66"x21" Putnam Tri. Grd.
- 1-54"x23" Pond. M.D.
- 1-48"x50" Pond. Tri. Grd.
- 1-45"x24" Pond. Tri. Grd.
- 1-38"x16" L. & S. Sel. Hd.
- 1-36"x14" Bdgford. Grd. Hd.
- 1-36"x14" Johnson. M.D.
- 1-30"x34"x12" L. & S.
- 10-26"x20, 18, 16" Bridgeford.
- 40-26"x18, 14, 10" N.B.P.
- 3-26"x12" Putnam. M.D.
- 25-26"x14, 12, 10" Bridgeford.
- 4-25"x12" LeBlond.
- 1-24"x10" Ciseo.
- 1-24"x16" L. & S. Sel. Hd.
- 1-24"x12" American.
- 2-20"x18, 16" Monarch.
- 20-20"x20, 16, 12, 8" Amer.
- 1-20"x8" American. Grd. Hd.
- 2-20"x10" LeBlond. Grd. Hd.
- 1-20"x8" L. & S. Sel. Hd.
- 1-20"x8" Lodge & Shipley.
- 1-18"x13" Reed-Pren. G.H.
- 1-18"x10" Lodge & Shipley.
- 3-17"x8" LeBlond Mfg.
- 3-16"x12, 6" Monarch.
- 3-16"x6, 8" Reed-Pren. G.H.
- 1-16"x8" Hendey, oil pan.
- 1-16"x6" Lodge & Shipley.
- 1-16"x6" Bradford.
- 1-16"x6" L. & S. Sel. Hd.
- 1-14"x12" LeBlond. Gd. Hd.
- 1-14"x8" Lodge & Shipley.
- 1-14"x10" Pratt & Whitney.
- 2-14"x6, 7" Reed-Pren. G.H.
- 1-14"x6" Monarch.
- 2-13"x6" Willard.
- 5-3 1/2"x60, 108" Lo-Swing.
- 1-4"x60" Lo-Swing.
- 4-14" Fay Automatic.
- 1-No. 12 LeBlond Multi-cut.

MILLING MACHINES

- 1-No. 4-36" Cin. Hydromatic.
- 1-No. 5 Cincinnati. late.
- 2-No. 5-B Becker-Brainard.
- 13-No. 4, 3, 2 M. 1 Cin.
- 14-No. 5-B, 3-B, 2, 1-B, 1 and 0 Brown & Sharpe.
- 5-No. 3-B, 2-B, 1-B Mil.

- 1-No. 21 Brown & Sharpe.
- 3-No. 2, 1 Kempsmith.
- 2-No. 20 Oesterlein.
- 1-No. 1 1/2 Rockford.
- 7-No. 25 Becker.
- 1-No. 2-M Cincinnati. Univ.
- 1-No. 3 Kempsmith. Univ.
- 1-No. 1B Milwaukee. Univ.
- 1-No. 6, 5, 4-B, 1 Becker.
- 1-Vertical Millers.
- 2-No. 4 Cincinnati Vert.
- 1-No. 5, 2 B. & S. Vert.
- 1-No. 3 Sundstrand Rigidmil. late model.
- 3-Type B. Briggs Mfg.
- 5-48", 24", 18" Cin. Auto.
- 3-No. 33 Kempsmith Mfg.
- 175-P. & W. Hendey Becker and Garvin Lincoln Millers.
- 1-24"x13"x20" Ingersoll.
- 2-24"x24"x12" Ingersoll.
- 1-36"x30"x7" Newton.
- 1-45"x17 1/2" Ingersoll.
- 1-50"x20" Ingersoll.
- 1-No. 3, 92"x54"x15" Beaman & Smith Planer Type.
- 1-Beaman & Smith Open Sd.
- 1-3 spdl. Beaman & Smith.

GEAR CUTTERS

- 1-No. 5-60" Brown & Sharpe.
- 3-No. 3-26" Brown & Sharpe.
- 2-No. 36-H G. & E.
- 10-No. 12, 3 Barber-Colman.
- 5-No. 6, 61 Fellows.
- 1-No. 18-H G. & E.
- 1-No. 36-BM G. & E.
- 1-12"x24" G. & E.
- 1-12"x10" G. & E.
- 1-No. 1 Schuchardt & Schutte.
- 2-18" Gleason.

BORING MILLS

- 1-10" Niles Vertical.
- 1-96" Betts Vertical.
- 1-72" Pond Vertical.
- 1-62" N.-B.-P. Vertical.
- 1-61", 51" Baush Vertical.
- 1-60" Gisholt Vertical.
- 1-60" Pittsburgh Vertical.
- 1-54" Bullard Vertical.
- 5-52, 42, 36, 30" Gisholt.

- 2-48"x42" Colburn Vertical.
- 2-44" Putnam Vertical.
- 3-12", 32" King Vertical.
- 1-36" Bullard. New Era.
- 1-36" Bullard Rapid Prod.
- 1-30" Flather Vertical.
- 1-No. 1 Cleveland Hor.
- 1-No. 5-3" Bar DeFrance.
- 1-5" Bar Ingersoll Hor.
- 1-5" Bar N.-B.-P. Floor.
- 1-2-spdl. Espen-Lucas.
- 2-No. 3 Barnes Hor. Radial.
- 1-No. 1 Barrett Horizontal.
- 1-No. 2-5" Bar Barrett.
- 3-No. 2 Rockford Horizontal.

GRINDERS

- 1-26"-37 1/2"x96 Norton.
- 1-20"x120" Landis.
- 1-18"x36" Norton.
- 1-16"x52" Landis.
- 1-16"x48" Landis Crank Pin.
- 9-14"x72", 50", 36" Norton.
- 2-12"x36" Modern.
- 22-10x72, 50, 36, 24" Norton.
- 7-10x72, 52, 36, 24" Landis.
- 1-10" Bryant Wide Wheel.
- 1-8"x18" Cin. Saddle Type.
- 2-No. 12-8"x36" B. & S.
- 5-6"x32" Norton. Plain.
- 1-5"x18" Ott. Plain.
- 1-No. 2, 2 1/2 Universal.
- 2-No. 1 Landis Universal.
- 1-No. 1 Modern Universal.
- 9-No. 60, 70 Head Int.
- 1-No. 20 Bryant. Int.
- 1-14" P. & W. Vert. Surf.
- 2-12", 8", Heald Rotary.
- 1-8" Arter Rotary Surf.
- 1-84" Diamond Face.
- 3-No. 1 1/2 Cincinnati Cutter.

TURRET LATHES

- 3-26", 18" Libby.
- 26-24" Davis.
- 8-24" Steinie. S. P. D.
- 8-24", 21" Gisholt.
- 2-No. 4-A, 2-A W.S.S.
- 1-21x8" LeBlond Univ.
- 2-No. 6 Brown & Sharpe.
- 3-3"x36" Jones & Lamson.
- 3-2-spdl. Jones & Lamson.

- 1-16" Cincinnati-Acme.
- 2-14" Warner & Swasey.
- 1-No. 33 New Britain Auto.
- 11-No. 5-A, 6-A P. & J.
- 4-14" Fay Automatic.

DRILLS

- 1-6" Western.
- 4-6", 4" Reed-Prentice.
- 1-5" American Triple Pur.
- 1-4" N.-B.-P. Universal.
- 1-4" Hammond.
- 1-2 1/2" Gang. Geared.
- 1-2-spdl. Sipp.
- 6-2, 3, 4, 6-spdl. H. & W.
- 8-1, 3-spdl. Leland-Gifford.
- 6-4, 3, 2, 1-spdl. No. 2. Colburn, manufacturing.
- 3-No. 4, No. 17, No. 2 4-spdl. Foote-Burt Rail.
- 2-No. 14, No. 12 Nateso Mult.
- 5-No. 14, No. 22, No. 26-AC. No. D-31 Fox Mult.
- 2-No. 2, No. 3 Western Mult.
- 3-No. D-4 Colburn.
- 2-No. 25-36" Foote-Burt.
- 2-No. 25-24" Foote-Burt.
- 1-25", 21" Weigle.
- 1-28" Hoefler. Slid. Head.

PLANERS

- 1-72"x84"x12" Gray.
- 1-60"x48"x12" N.-B.-P.
- 2-50"x56"x32, 16" Cin.
- 2-48"x48"x16, 10" N.-B.-P.
- 1-48"x48"x10" Gray.
- 1-36"x36"x24" Gray.
- 3-36"x36"x18" Cincinnati.
- 2-36"x36"x10, 8" Ohio.
- 1-36"x36"x16" N.-B.-P.
- 1-36"x26"x10" Whit-Blaiss.
- 1-36"x32"x8" Cincinnati.
- 1-30"x30"x14" N.-B.-P.
- 1-26"x28"x10" Gray.
- 2-24"x24"x6" Gray.
- 1-24"x24"x6" Flather.
- 2-24"x24"x8" W. & P.
- 1-24"x24"x6" American.

SHAPERS

- 1-24" G. & E., M.D.

- 1-20" Amer., M.D., self-ill.
- 1-20" Cincinnati. M.D.
- 1-16" G. & E., M.D.

SCREW MACHINES

- 1-No. 10-3" Bardons & O.
- 5-No. 8, 6 Warner & Swasey.
- 1-No. 4 1 1/2" Milholland.
- 3-1" Pratt & Whitney.
- 3-2", 1 1/4", 9/16" Gridley.
- 3-No. 52 Nat. Acme Auto.
- 1-1 1/2"x5" 6-spdl. New Britain.
- 3-1 1/4" 4-spdl. Gridley.
- 2-2 1/4" 1-spdl. Gridley.
- 1-4" Model H Gridley Chuck.

PRESSES

- 1-No. 54 Bliss.
- 12-No. 20 Bliss. O.B.I.
- 1-No. 4 Walsh. O.B.I.
- 1-No. 4 1/2 R. & K.
- 2-No. 203 Bliss S. S.
- 1-No. 54-S Toledo S.S.
- 1-No. 10 Zeh & Hahnmann.
- 1-No. 57 Toledo Nosing Pr.
- 1-No. 58 Toledo Nosing Pr.
- 1-No. 30-G-32 Clev. Gap.
- 1-No. 91-B Toledo S.S.
- 1-No. 201-C Spec. Toledo.
- 1-No. 203-B Toledo Gap.
- 1-No. 307 Bliss S.S. 9" stroke. Single Crank.
- 1-No. 5-C Bliss S.S.
- 1-No. 345 1/2 Hamilton S.S.
- 1-No. 202-C Toledo Gap.
- 1-No. C-16 Ferracute O.B.I.

MISCELLANEOUS

- 1-No. 1 Garvin Tapper.
- 1-3 1/4" Hendey Centering.
- 1-Type "P" Oilgear Assembling and Forcing Press.
- 26-Garvin. Betts. Newton & P. & W. Profilers.
- 1-24" Niles Grd. Slotted.
- 3-12", 8", 4" Bignall & Keeler Pipe Machines.
- 1-No. 1 LaPointe Broach.
- 1-1" Acme Bolt Cutter.

SOLD UNDER
MONEY-BACK
GUARANTEE

HILL, CLARKE & CO.

647 Washington Blvd.
CHICAGO
Phone: Haymkt. 7660

SIMMONS "RESTORED" MACHINES

A few selections from our stock of 2,000 guaranteed "Restored" machines

PLANERS

- 1-24"x24"x8" Cincinnati
- 1-24"x24"x10" W.-Blaisdell
- 1-30"x30"x8" N.-B.-P. Belt Drive
- 1-30"x30"x12" Cincinnati M.D.
- 1-30"x30"x12" N.-B.-Pond M.D.
- 1-30"x30"x18" Cincinnati 2 hds.
- 1-30"x30"x32" Cincinnati 3 hds.
- 1-36"x24"x12" D. & H. Openside
- 1-36"x36"x10" W.-Powell 4 hds.
- 1-36"x36"x10" N.-B.-Pond 4 hds.
- 1-36"x36"x14" Cincinnati 2 hds.
- 1-36"x36"x12" N.-B.-Pond 4 hds.
- 1-36"x36"x14" N.-B.-Pond 2 hds.
- 2-42"x42"x22" Cincinnati M.D.
- 1-48"x48"x16" Pond 4 hds.
- 1-60"x60"x14" Powell 2 hds.
- 1-60"x60"x18" Cincinnati 4 hds.
- 1-72"x72"x16" D. & H. Openside
- 1-96"x54"x12" D. & H. Openside
- 1-120"x72"x16" N.-B.-Pond M.D.

DRILLING MACHINES

- 1-6" American Universal Radial
- 1-5" Drexel Universal Radial
- 1-5" Niles Universal Radial
- 1-5" Bickford Universal Radial
- 1-5" Drexel Plain Radial
- 1-5" Drexel Plain Radial
- 1-5" Western Plain Radial
- 1-4" Bickford Plain Radial
- 1-3 1/2" Gang Plain Radial
- 1-3 1/2" American Plain Radial
- 1-2 1/2" American Plain Radial
- 1-No. 310 Baker Heavy Duty
- 1-No. 4-D Colburn Heavy Duty
- 1-No. 2-D Colburn Heavy Duty
- 1-No. 2-D Minster Heavy Duty
- 1-No. 1-D Colburn Heavy Duty
- 1-34" Prentice Sliding Head
- 1-30" Snyder Sliding Head
- 2-28" Snyder Sliding Head
- 3-25" Weigel Sliding Head
- 1-24" Cincinnati Sliding Head
- 2-22" Snyder Sliding Head
- 1-21" Hoefler Back Geared
- 1-No. 13 Nateso Multiple
- 1-No. 14 Nateso Multiple
- 1-No. 15 Nateso Multiple
- 2-No. 4 Baush Multiple
- 1-No. 3 Baush Multiple
- 1-No. 5-D Moline Cylinder

- 1-No. 2-D Moline Cylinder
- 1-No. 11-D Moline
- 1-6-spindle Avey High Speed
- 1-4-spindle H.-Wright High Speed
- 2-4-spindle Sipp High Speed
- 2-4-spindle L.-Gifford High Speed
- 1-4-spindle Barnes All Geared
- 1-4-spindle Colburn No. 2
- 6-4-spindle Rockford 23" Gang
- 2-4-spindle Edlund High Speed
- 2-3-spindle Sipp High Speed
- 1-3-spindle Rockford Gang
- 1-3-spindle Allen High Speed
- 2-2-spindle Edlund High Speed
- 2-2-spindle Allen High Speed
- 2-1-spindle H.-Wright High Speed
- 1-1-spindle Kern High Speed
- 1-1-spindle Allen High Speed
- 1-1-spindle Avey High Speed
- 2-1-spindle Edlund High Speed

BORING MILLS

- 1-16" Betts M. Drive
- 1-12" Niles Rapid Traverse
- 1-10-16" Niles Extension
- 1-7-10" Betts Extension
- 1-96" Cincinnati Motor Drive
- 1-100" N.-B.-Pond Motor Drive
- 1-62" N.-B.-Pond Rapid Traverse
- 2-48" Colburn Rapid Traverse
- 2-44" N.-B.-Pond Rapid Traverse
- 1-44" Putnam Rapid Traverse
- 1-42" Bullard Rapid Traverse
- 1-37" Bridgeport Vertical
- 1-36" Bullard New Era
- 1-34" Colburn Turret Head
- 1-34" Bertram Turret Head
- 1-30" Bullard Turret Head
- 2-24" Bullard Rapid Prod.
- 1-No. 3 Universal Horiz. Precision
- 1-No. 0 Detrick-Harvey Floor Type
- 1-60" N.-B.-Pond Horizontal
- 1-No. 3 Betts Horizontal
- 1-No. 3 Barrett Cylinder
- 1-7" Bar Newton Horizontal
- 1-6" Bar Espen-Lucas Horizontal
- 1-4 1/2" Bar N.-B.-Pond Floor Type
- 1-No. 40 Landis Floor Type

SHAPERS AND SLOTS

- 1-14" Davis Shaper
- 1-15" Potter-Johnson Shaper

- 1-16" Stockbridge Shaper
- 1-16" Milwaukee Shaper
- 1-20" G. & Eberhardt Shaper
- 1-20" Hendey Shaper
- 1-20" Kelley Shaper
- 1-20" Cincinnati Shaper
- 1-24" Simmons Shaper
- 1-24" Rockford Shaper
- 1-24" Steptoe Shaper
- 1-26" N.-B.-Pond Traveling
- 1-32" G. & Eberhardt Shaper
- 1-10" N.-B.-Pond Sletter
- 1-15" Newton Sletter
- 1-15-18" Dill Sletter
- 1-18" Dill Sletter
- 1-20" Bement Sletter
- 1-22" Bement-Miles Sletter

GEAR CUTTERS

- 1-No. 6 Fellows Gear Shaper
- 1-No. 61 Fellows Gear Shaper
- 2-6" Gleason Bevel Generator
- 1-15" Gleason Bevel Generator
- 1-18" Gleason Bevel Generator
- 1-24" Gleason Gear Planer
- 1-48" Gleason Gear Planer
- 1-77" Gleason Gear Planer
- 1-No. 2-B Newark Spur and Bevel
- 1-No. 13 Brown & Sharpe Spur and bevel
- 1-No. 3 Brown & Sharpe Spur
- 1-36" G. & Eberhardt Spur
- 1-No. 5 Brown & Sharpe 60" spur
- 2-90" Pratt-Whitney Spur
- 2-No. 3 Barber-Colman Hobber
- 1-No. 12 Barber-Colman Hobber
- 1-No. 12-H G. & E. Hobber
- 1-24-H G. & Eberhardt Hobber
- 1-No. 5-A Lees-Bradner Hobber
- 1-No. 96-H G. & Eberhardt Hobber
- 1-48" Gould-Eberhardt Rack Cutter

PRESSES

- 1-No. 172 Bliss Sprue Cutter
- 1-No. 551 Ferracute Double Crank
- 1-No. 102 Ferracute Double Crank
- 1-No. 103 Ferracute Double Crank
- 1-No. 56 Toledo Straight Column
- 1-No. 55 Ferracute Drawing
- 1-No. 77 Bliss Cam
- 1-No. 69 Bliss Cam
- 1-No. 167 1/4 Toledo Toggle

TURRET LATHES AND SCREW MACHINES

- 1-No. 2 Foster Friction Head
- 2-No. 2-A Warner-Swasey Universal
- 1-No. 3-A Warner-Swasey Universal
- 8-No. 4 Warner-Swasey Universal
- 5-No. 6 Warner-Swasey Turret
- 1-No. 6 Woods Turret
- 2-26" Libby Turret
- 3-18" Libby Turret
- 1-4 1/2"x20" Bardons-Oliver Turret
- 1-3 1/2"x26" Pratt-Whitney Turret
- 1-2 1/2"x26" Acme Turret
- 4-2 1/2"x26" Pratt-Whitney Turret
- 1-1 1/2"x18" Pratt-Whitney Turret
- 1-1 1/2"x9" Acme Turret

MISCELLANEOUS

- 1-1" Acme Bolt Cutter
- 1-1 1/2" Acme Bolt Cutter
- 1-1 1/2" Landis Double Bolt Cutter
- 2-1 1/2" Landis Double Staybolt
- 2-No. 0 W.-White Bulldozers
- 1-No. 1 W.-White Bulldozer
- 1-No. 4 LaPointe Broach
- 1-No. 1-B Nazi Hammer
- 1-25-lb. Bradley Hammer
- 1-100-lb. Bradley Hammer
- 2-300-lb. Bradley Hammer
- 1-500-lb. Bradley Hammer
- 1-800-lb. Morgan Steam Hammer
- 1-3500-lb. Niles Steam Drop
- 1-No. 0 Baker Keyseater
- 1-No. 2 Baker Keyseater
- 1-No. 2 Morten Keyseater
- 1-No. 3 Catlin Keyseater
- 1-No. 3 1/2" Baker Keyseater
- 1-No. 5 Baker Keyseater
- 1-No. 2 Williams-W. Eyebender
- 1-No. 2-BG Garvin Tapper
- 1-No. 2 Garvin Tapper
- 1-1 1/2" Ajax Upsetter
- 2-Acme Steel Bed
- 1-B-Keeler Pipe Cutter

SOLD UNDER MONEY BACK GUARANTEE-ASK FOR OUR CURRENT STOCK LIST

SIMMONS MACHINE TOOL CORPORATION
BUFFALO, 601 Morgan Bldg. ALBANY, 1700 Troy Road NEW YORK, 149 Broadway

**PUNCH PRESSES**

Bliss No. 18—O.B.I.
Bauroth No. 4—O.B.I.
V. K. & V. No. 4½—O.B.I.

SHEARS AND ROLLS

Long & Allstatter No. 2 Single End Punch and Shear.
Crosby Co.'s No. 5 Single End Punch and Shear.
Stoll No. 296, 8"—14 gauge.
Bertsch 8"—10 gauge.
Canton Fdry. and Mch. Co.'s No. 3 Alligator Shear—Motor Drive.
Bertsch No. 7½ Plate Straightening Roll, capacity—¾"x4".

BORING MILLS

Gisholt 36" Vertical.
1 each—Fosdick & Rochester Floor Type Boring, Drilling and Milling Machines—Motor Drive.

HYDRAULIC PRESS

American Broach & Mch. Co.'s 12-ton V-2 Vertical Hydraulic Press.

Send for complete list.
Warehouse—Dayton, Ohio.

THE SEIFREAT-ELSTAD MACHINERY CO.

CINCINNATI DAYTON COLUMBUS

Thread Millers and Gear Cutters

3 Waltham Bench Thread Millers.
1 Waltham Automatic Pinion Cutter, No. 1.
2 Waltham Semi-Automatic Pinion Cutters, No. 1.
1 Waltham Semi-Automatic Pinion Cutter, No. 2.
2 Small Sloan & Chase Bench Pinion Cutters.
All of these are in A-1 Shape. Write for full description.

IDEAL MACHINERY CO.
Plainville, Conn.

LATHES

2—14" x 6' Hendey Tie Bar Head, with taper and draw-in attachments.
18"—20¼" x 8' Lodge & Shipley Latest Type, D.B.G., double nose spindle, with taper and draw-in attachments. Serial No. 25804.
20" x 10' Monarch Geared Head, Motor Driven, with Motor.

SHAPERS

20" Gould & Eberhardt Back Geared, Single Pulley Drive, with dual control for hand cross feed. Serial No. 367A2. Good as new, used less than three months.
24" Gould & Eberhardt Back Geared, cone drive.

DRILLS

42" Cincinnati Bickford Plain Radial, gear box, motor drive, late type.
Four Spindle Allen Hi-Speed, Ball Bearing.

DELTA EQUIPMENT CO.

148 N. THIRD STREET
PHILADELPHIA, PA.

EXCEPTIONAL VALUES REBUILT MACHINE TOOLS

36" Gisholt Vert. Boring Mill, Tur. Hd., (P.R.T.)
No. 1 Cleveland Horiz. Boring Mill, 2½" Dia. Bar.
No. 22, No. 23, No. 24 and No. 33 New Britain Auto. Chuck Mach.
No. 2, No. 3-B and No. 4 G. N. La Pointe Broach Mach.
No. 3 Toledo Vert. Milling Mach., S.P. Drive.
No. 3 and No. 4-B Becker Vert. Milling Mach.
No. 3, No. 2 and No. 1 Kempsmith Plain Milling Mach.
No. 3, No. 2-H and No. 1½ Brown & Sharpe Plain Milling Mach.
No. 2 Cincinnati Univ. Milling Mach.—Complete.
No. 3 Kempsmith Univ. Milling Mach.—Complete.
48"x12"x8" Ingersoll Slab Miller—Adjustable Rail—Horiz. Slide.
28" Cincinnati Semi-Auto Duplex Milling Mach.
36"x18" Lodge & Shipley Q. C. Lathe.
30"x11" Lodge & Shipley Q. C. Lathe—Tap. Att.
24"x16" Lodge & Shipley Q. C. Lathe—Tap. Att.
26"x16" Whitcomb-Blaisdell Geared Head Q. C. Lathe—Taper Attach.
18"x10" American Hi-Duty Grd. Head Q. C. Lathe.
16"x8" Lodge & Shipley Selec. Grd. Hd. Q. C. Lathe.
14"x8" American Hi-Duty Geared Head Q. C. Lathe.
3"x36" Jones & Lamson Die. Spdl. Turret Lathe—(Air Chucks).
3½"x36" Acme Geared Head Turret Lathe—(Chuck Equip.).
No. 4 Warner & Swasey Universal Turret Lathes.
No. 4 and No. 7 Barbours & Oliver Turret Lathes.
28" Gould & Eberhardt Hi-Duty B. G. Crank Shaper.
24" and 26" Walcott Hvy. Duty B. G. Crank Shapers.
24" Cincinnati Hvy. Duty B. G. Crank Shaper.
16" Gould & Eberhardt Hi-Duty B. G. Crank Shaper.
36"x36"x16" Cincinnati Hvy. Duty Tu-Speed Planer (Two Heads).
6", 5" and 4" American Triple Geared Plain Radials Gear Box.
4" Drees Hi-Duty Plain Radial Gear Box.
3" Mueller Plain Radial Gear Box.
2½" Carlton B. B. Sensitive Radial—Tap. Att.
31", 26" and 22" W. F. John Barnes Upright Drills.
25" and 21" Weigle Upright Drills.
D. No. 2, D. No. 3, D. No. 4, Colburn Hvy. Duty Drills.
D. No. 2 Detroit Five Spdl. Horiz. Driller.
Allen 1, 2, 3, and 4 Spdl. B. B. Drills—No. 2 M. T.
No. 12 Pratt & Whitney Multiple Drill—equipped with 14 Spdles.
No. 1 Baker Bros. Reverser—Cap. 1½" Keyways.
No. 3-A and No. 3-A Hvy. Duty High Speed Riveting Hammers.
No. 29—53" Besley Horiz. Disc Grinder Motor Dr.
No. 2, No. 3, and No. 4 Brown & Sharpe Univ. Grind.
12" Pratt & Whitney Vert. Surface Grinder Rotary Chuck.
12"x36" and 16"x32" Landis Pl. Self Cont. Grinders.
No. 91-D Toledo Die. Crank Geared Power Press.
No. 1 and No. 3 Consolidated O. B. I. Power Presses.
No. 2 and No. 3 Pratt & Whitney Die Sinks.
6"x14" and 6"x89" Pratt & Whitney Thread Millers.
96" Bliss Power Gap Square Shear Cap. 1/16".
No. 2 and No. 2X Garvin Auto. Tappers.
15 Ton Lucas Power Forcing Press.

Send Us Your Inquiries

The Eastern Machinery Co.

3261 Spring Grove Ave., Cincinnati, Ohio
We Also Buy Machinery.
What Have You to Sell?

BORING MILL

No. 6 DEFIANCE. 4½" bar. Height bar to table 38". Distance spindle to outer support 84". 36" x 64" table with Defiance outboard supports. Has motor drive and vertical milling attachment.

VERTICAL MILLER

No. 3 BROWN & SHARPE. Single Clutch Pulley Drive. Tapered and slotted spindle nose. Power rapid traverse. Have three.

PRESS

No. 67 CONSOLIDATED, straight side tie rod frame. Double Geared. Friction Clutch. 8" stroke. Weight, 32,500 lbs.

UPSETTERS

4" ACME Steel Bed. Stop motion type, belt driven.
1½" AJAX. Continuous motion. Steel Bed.
1½" ACME steel bed. Stop Motion, Motor Drive.
1" AJAX Steel Bed: Continuous Motion; Automatic Roller Feed.

MILES
MACHINERY COMPANY
SAGINAW, W.S.
MICHIGAN

EVERY ONE GUARANTEED**BORING MILLS**

1—BULLARD 24" Ver., N.E. Type.
1—BULLARD 42" N.E. type Ver.
1—BETTS 7" Ver.
1—BETTS 8" Ver.
1—CIN. 8" Ver.
1—BETTS 10" Ver.
1—REMENT MILES 10'-16' extension Ver.
1—NILES 10'-16' extension Ver.
1—NILES 14' Ver.
1—NILES 14'-16' extension Ver.
1—REMENT MILES 2½" horiz.
1—ROCKFORD No. 2 horiz. 3½" bar.
1—LANDIS No. 35—3½" bar, horiz.
1—N.B.P. 4" bar table type, horiz.
1—BAURETT No. 2—5" bar horiz.

DRILLS—Multiple Spindle

4—BAUSH No. 1, round and rect. hds.
1—FOX D-31 round hd.
6—NATCO No. 12, 13, 14, 30 and 37 round and rect. hd.
1—MOLINE No. 5-D Cyl. Borer.

DRILLS—Upright

1—COLBURN D-4.
6—HENRY & WRIGHT 1-2-3-4 spdl.
1—LELAND & GIFFORD, 2 spdl.
3—SIFE, 2 and 4 spindle.
1—P & W No. 1 and No. 12 deep hole.
1—BAKER No. 319.

DRILLS—Radial

1—AMERICAN 2½" Pl. SPD.
1—AMERICAN 3" Triple purpose, SPD.
1—CIN. ROCKFORD 5" Univ. MD.
1—HAMMOND 4" Pl.
1—AMERICAN 6" Pl. triple pur.
1—BAUSH 6" Pl. belt drive.
1—N.B.P. 96" Pl. MD.
1—CIN. ROCKFORD 5" Univ. MD.
1—DRESSES 5" Univ. MD.
1—CIN. 6" Univ.
1—ROCKFORD 6" Univ. SPD.

GEAR CUTTERS

12—B x 8 3x36, 4x36, No. 6, 60 in. No. 13.
6—BARBER-COLMAN No. 12.
7—LEBS-BRADNER No. 5-A.
1—PFAUTER No. 3 40" cap.
1—PFAUTER No. 3 72" cap.
3—FELLOWS Gear Grinders.
8—FELLOWS Nos. 6, 61, 65, 615.
4—FELLOWS No. 7 high speed.
3—GLEASON 6-in., 11-in., 18-in.

MILLING MACHINES

6—B & S Nos. 2, 2B Pl.
8—CIN. Nos. 1½, 2, 3, 4 Pl.
1—LEBLOND No. 3 Univ.
1—B & S No. 3A Univ.; SPD.
1—CIN. No. 3 Univ.
3—BECKER Nos. A, B, C, 6 Ver.
1—CIN. No. 3 Ver.
1—TAYLOR & FRANK Ver.
8—BRIGGS Type "A" Mfg.
1—INGERSOLL 24 in. x 24 in. x 10 ft.
1—KEMPSMITH No. 33 Mfg.
1—KARNNEY & TRECKER No. 1-A Mfg.
2—P & W 5 in. 12 in. Mfg.
6—P & W 6x14, 6x48, 6x80 Thread.
1—HANSON WHITNEY Thread.
1—COCHRAN & BLY No. 14 Combination.

LATHES

3—HENDRY 24-in. x 6 ft., 16-in. x 6 ft., 16-in. x 8 ft., grd. hd.
2—SEBASTIAN 18-in. x 5 ft.
2—SPRINGFIELD 18-in. x 10 ft.
2—REED-PRENTICE 20-in. x 10 ft. spd.
1—REED-PRENTICE 24-in. x 12 ft.
3—LEBLOND 26-in. x 10 ft. Dupl. Crank.
1—REED-PRENTICE 27-in. x 12 ft. SPD.
1—P. E. REED 32-in. x 27 ft.
1—NILES 38-in. x 24 ft.
1—N.B.P. 42-in. x 24 ft.
1—MC CABE 48-in. doub. spdl.
7—LEBLOND No. 12 Multicut, Lathes of all sizes and types.

SHAPERS

1—REMENT 20-in. Cr. Slotter.
1—REMENT 36-in. Cr. Slotter.
1—GOULD & EBERHARDT 24-in.

Partial list of our stock.
Send us your inquiries.

MOREY
AND COMPANY, INC.
410 Broome St., New York, N. Y.
Telephone Canal 5360

S T A M P I N G

P R E S S E S

JOSEPH & SONS

NEW AND REBUILT

ALL MAKES AND TYPES

1109A, LIVINGSTON AND ALMOND STS.
PHILADELPHIA, PA.

New 3 phase motors 1 to 15 H. P. 5 H. P. \$65.50

Boring Mill, No. 3 Colburn, Vertical.
Compressors, 6x3, 6x5, 8x8.
Drill, Hanch, 5" radial.
Drill, Hilbert, 2" radial.
Drill, No. 66 D Moline Hole Hog, 7 spindle.
Drills, 21", 26", 28", and 32" sliding head.
Furnace, Weco elec. oven.
Gear Cutter, No. 13 Brown & Sharpe.
Grinders, Surface No. 1 and No. 78 W. & M.
Grinder, 6"x13" Fitchburg, plain.
Grinder, 12"x16" Cincinnati Universal.
Grinder, 16"x18" Landis Universal.
Lathe, 12"x8" Willard quick change.
Lathe, 14"x6" Monarch, quick change.
Lathe, 13"x16" Sebastian, motor drive.
Lathe, 20"x10" Hamilton, new model.
Lathe, 20"x10" American, geared head.
Lathe, 24"x24" Prentice.
Milling Machines, 24"x20"x8" Ingersoll horizontal.
Milling Machines, No. 2 Bilton (2).
Milling Machine, B. & S. No. 2 heavy.
Miller, Becker No. 7.
Miller, No. 2 Kearsney plain, new.
Planer, 24"x24"x12" American, 1 head.
Planer, 36"x36"x12" Gray, extra heavy, 4 heads.
Planer, 36"x36"x11" Gray, two heads.
Planer, 42"x12"x12" Gray, two heads.
Presses, Federal open back inclinable.
Presses, Nos. 1, 1½, 2 and 4 Robinson.
Punch and Shear, 1½"x½", 10" throat.
Screw Machine, DeLancey No. 3.
Screw Machine, Millholland 1" and 1½".
Shaper, 18" American Bark Geared Crank.
Shaper, 16" O. & S., new.
Shaper, 24" O. & S., cone drive.
Shear, No. 362 Robinson square.
Shear, square 60" Pettis, 18 gauge.
Shear, No. 26 Quickwork, 14 gauge, 30" throat.
Shear, No. 12 Pettis, 60" throat.
Washing Machine, Blakeslee.

THE OSBORNE & SEXTON
MACHINERY COMPANY
COLUMBUS OHIO

AUTOMATICS & OVERHEAD

Here's a chance for someone to cut that overhead by installing this battery of three nearly new Brown & Sharpe Automatic Screw Machines,—two No. 00 and one No. 0, all equipped with screw slotting attachment and usual parts. Prices are lower than often asked for inferior machines. Send for details.

We regularly publish an illustrated Stock Bulletin, listing hundreds of good Used Tools. A copy is yours for the asking.

MONARCH
MACHINERY COMPANY
300 N. Third St., Philadelphia

GOOD AS NEW

48" x 16' all geared head Lodge & Shipley motor driven lathe, quick change gear, rapid traverse.
42" x 42" x 12" Cincinnati planer, reversing motor drive, box table, 4 heads, rapid traverse.
3" bar Rochester horizontal boring mill, motor drive, rapid traverse, table 42" x 22".
24" Gould & Eberhardt shaper, cone drive.

O'BRIEN
Machinery Company
113 N. 3rd St., Philadelphia, Pa.

1 No. 12 Natco Multiple Spindle Drill arranged for Motor Drive with motor.

1 No. 14 Natco Multiple Spindle Drill arranged for Motor Drive.

NOBLE MACHINERY CO.
207 Centre St. New York, N. Y.

→ **95%** ←

Modern Latest Design Millers, Punch Presses, Shapers, Tur- ret Lathes, etc.

No. 2 B & S Cone Drive Univ. Miller, latest design.
No. 3 SUNDSTRAND RIGIDMIL, Motor Drive.
16" AMERICAN Auto-Oiled Motor Drive Shaper.
3" B. & E. Single Pulley Drive Shaper.
3" AMERICAN Triple-Purpose Plain Radial Drill, Motor Drive.
No. 1-A WARNER & SWASEY Turret Lathe Motor Drive, Latest Design.
No. 249 BARNES Honing Machine, motor drive, Like New.
15—No. 0 VERNON Bench Power Punch Presses on Table and Legs.
5—No. 1 LOSHBROUGH-JORDAN O.B.I. Punch Presses.
No. 4 LOSHBROUGH-JORDAN O.B.I. Punch Press.
No. 19, No. 20 & No. 21½ BLISS O.B.I. Presses Motor Drive.

OUR LATEST LIST UPON REQUEST.
WHAT ARE YOUR REQUIREMENTS?

THE E. L. ESSLEY MACHINERY CO.

551 W. Washington Blvd., Chicago, Ill.
78-80 W. Water St., Milwaukee, Wis.

72" Niles Vert. Mill, 2 heads, all geared feeds.
National Bulldozer, 16" stroke, cross-head 36" long.
South Bend Lathe 16"x8" Bradford 36"x14".
B. & S. No. 4, Cinn. No. 1½ Univ. Millers.
Signal-Keeler 6" Pipe Machine.
D. & H. Openside Planer, 42"x42"x10".
Rockford No. 3 Inc. Presses No. 18 Bliss.
Niles 200 ton Hydraulic Wheel Press.
Cleveland 72" Multiple Punch—79 ½" holes.
Massillon Punch Shear, 22" tht., Arch jaw.
Cleveland Punch Shear, 48" tht., arch jaw.
Cincinnati 32" Triple Grd. Shaper, M.D., 20".
Hilles-Jones No. 3 Dbl. Angle Shear 6"x6"x1".
S. L. Combination Welder, 200 Amp., 3-60-220, Gasoline Engine.

RUSSELL MACHINE COMPANY
Pittsburgh, Pa.

MULTI DRILLER—New

1—Type B 16 NATCO with 24" round head new\$ 2000.00

TRACTORS

3—Mercury, with Edison 30 cell batteries\$ 200.00 ea.

ADDRESS BOX C-978

care The Iron Age, 1362 Hanna Bldg., Cleveland, Ohio.

Furnace, for rivets, Retort 12"x8", Loading Chute, 30"x18"x60", M.D.
Grinder, No. 1 Norton Univ. Cutter & Tool.
Grinder, 18"x36" Norton, plain self-cont. drive.
Hammer, No. 2-B. Naze, belted. (Rebuilt).
Lathe, 20"x10" Hendey Q.C.G., TA; belted M.D.
Lathe, 21"x12" LeBlond, Geared Head; S.P.D.; Pan.
Millers, Univ. No. 3 & 4 B. & S., Cone drive.
Planer, Openside, 20"x36"x10" Cleve., 3-Hds.
Press, S.A. Bliss, Horn type, Adj. bed for M.D.
Press, S.S., S.C., B.G., Phila. 3½" str. 7000 lbs.
Press, Perkins, S.S.; S.C.; 2" str., bed 16"x18" M.D.
Shears, Plate 12"x¼" M.D.; 96"x14 ga. B.D.

UPSETTERS

3½" Ajax, Steel Frame, Crane & Trolley.
1½" Ajax, Steel Frame, Crane & Trolley.
3" Acme, Steel Frame, for Motor Drive.
1½" Acme, Steel Frame, for Belt Drive.

MARR - GALBREATH
MACHINERY CO.
58 Water Street, PITTSBURGH, PA.

Potter & Johnston No. 2M Auto. Miller.
Cincinnati No. 2 Universal Miller.
Besly No. 6 Double Spindle Grinder.
Landis 6 x 18 Plain Grinding Machine.
Potter & Johnston 15" Universal Shaper.
Hendey 15" Friction Shaper.

GENERAL MACHINERY CORP.
"The Machine Tool Merchants"
140 Federal St., Boston, Mass.

BARGAINS—USED MACHINES

1—16x8, Marvel Chucking L. & S. Lathe.
1—16x8, 3 Step, D.B.G., L. & S. T/R Lathe.
2—18x10, Selective Mfg. L. & S. Lathes.
3—22x10, Patent Head, L. & S. Chucking Lathes.
1—27"x18" 3 Step Cone D.B.G., L. & S. Lathe.
1—36"x18" 3 Step Cone Head D.B.G., L. & S. Lathe.
1—30"x56" Heavy Duty L. & S. Forge Drilling Lathe.
1—Reversing Planer control for D.C. Motor complete with 15 H.P., 115 Volt, 225-290 R.P.M. Variable Speed Motor.
1—Buffalo Forge Co. Fan and Heater Unit.
1—Automatic Thread Chasing Machine.
1—Bement-Niles Co., Horizontal Boring Machine.
1—Heald No. 210 Ring Surface Grinder.
1—Cintl Gear Cutting Mach. Co. No. 3 Gear Cutter Grinder.
1—Brown & Sharpe No. 4—36" Automatic Gear Cutter.
1—Bryant No. 10 Semi-automatic Internal Grinder.
1—Newton Vert. Slab Miller, Working Surface of Table 10"x6". Max. Dist. from Spindle to Table 21".
1—3 H.P., 220 V., 1500 R.P.M., D.C. Reliance motor. Send for complete detailed descriptions.

The Lodge & Shipley Mach. Tool Co.
Cincinnati, Ohio

BORING MILLS

Giddings & Lewis No. 32, 3¼" bar.
Bullard 60" cone drive, 2 heads.

WACHS-GREGG & CO.

117 to 121 North Jefferson St., Chicago, Ill.

RELIANCE MACHINERY SALES COMPANY

1406 Brighton Road, Pittsburgh, Pa.

No. 27 W. & W. Bulldozer, Motor Drive.
No. 4 Colburn Mfg. Type Drill, 4 Spds.
No. 5-D Colburn Special H. D. Drill.
14"x8" L. & S. Grd. Hd. Lathe, SPD.
16"x8" Hendey Lathe, Tie Bar Head.
20"x10" Monarch Grd. Hd. Lathe, SPD.
30"x10" L. & S. Lathe, Q.C.G., D.B.G.
48"x10" 8" Betts H.D. Grd. Hd. Lathe.
No. 4 W. & S. Turret Lathe, G.F.H.
No. 2 Cincinnati Universal Miller, B.D.
No. 2 Ohio Plain Miller, S.P.D. (2).
No. 2 AS Milwaukee Plain Miller, S.P.D.
No. 2 Cincinnati Vertical Miller.
35"x24"x10" Newton Slab Miller, M.D.
Planers, 22", 24", 30", 33", 36" and 38".
4' Fosdick Plain Radial, S.P.D., G.B.
24" and 32" Gould & Eberhardt Shapers, M.D.
25" Smith & Mills B.G. Crank Shaper, S.P.D.
No. 3 Ryerson Hl. Sp. Friction Saw, M.D.
8' Stoll & 10' Bertsch Power Sq. Shears.

One—36 x 15' American motor driven lathe.
One—No. 1 Brown & Sharpe Universal Grinder.
One—No. 1 Kearsney Universal Miller.
One—No. 1½ Kearsney & Trecker Plain Miller.
One—2½' American Radial Drill.
One—16" American Shaper.
Two—No. 1 Garvin Automatic Tappers.
One—No. 128 Frankfort Hardening Furnace.

H. A. SMITH MACHINERY CO.
501-505 East Water St. Syracuse, N. Y.

36" Bullard NEW ERA Vertical Tur-
ret Lathe.
42" Bullard Vertical Boring Mill.
24" x 16" LeBlond QCG Lathe.
24" x 27" Fitchburg Lathe.
20" Rockford B. G. Shaper.
No. 13 B & S Gear Cutter.
No. 3, 26" B & S Gear Cutter.
No. 13 B & S Universal & Tool
Grinder.
No. 13-B B & S Plain Miller.
No. 4 Warner & Swasey GFH Turret
Lathes.

BROWNELL MACHINERY CO.
150 Pine St., Providence, R. I.

D. E. DONY

143 Cutler Bldg., Rochester, N. Y.

No. 7 Fellows Gear Shapers.
No. 1 Adams Gear Hobbers.
No. 2 Brown & Sharpe Surface Grinder.
Cincinnati Centerless Grinder.
14x6 Hendey Lathe.
No. 18 Bliss Presses.
No. 20 Bliss Press.
No. 21 Bliss Press.

BLISS TOGGLE

Nos. 409-b, 5-S, 3½-C.
Toledo: Nos. 168½.

DOUBLE CRANK—

Toledo: Nos. 96-E,
93-A, 92-B & 204-D.
Toledo: Nos. 59¾ & 56

2½", 3", 3½", 4" & 5"

Acme & Ajax Upsetters

36" Bullard V.T.L. (New Era) M.D.
42" Gisholt Boring Mill; turret head and swivel head, M.D.
51" Niles Boring Mill; 2 heads.
12" Betts Boring Mill; 2 swivel heads.
5" bar Detrick & Harvey Floor Type Boring and Milling Machine.
D-3 Colburn H. D. Drill; 3" cap.
No. 5½ Foote-Burt 6 Spindle Rail Drill; 3" cap. in steel; No. 5 M.T.
7" Dreeses Univ. Radial; Tap. Attach.
48"x84"x20" Detrick & Harvey Open-side Planer; 3 heads.
60"x60"x18" Detrick & Harvey Open-side Planer; 3 heads.
No. 6-A 72x20 Cincinnati Gear Cutter.
No. 3 Baker Bros. Keyseater.
54"x18" New Haven Lathe.
26" Libbey Turret Lathe, 7½" hole.
No. 2 Ryerson H-Speed Friction Saw.
No. 103, 204 and 208 Swagers.
No. 67 Consolidated S.S. Grd. Press.
Fifty Inclinable Presses in Stock.

D. C. OVIATT & COMPANY
Lakeside Avenue, Cleveland, Ohio

14" x 6" Hendey lathe.
42" x 42" x 26" Wheeler planer, 2 heads.
No. 6-A Potter & Johnston turret lathe (4).
26" Brown & Sharpe gear cutter.
¾" Lennox rotary bevel shear.
No. 14 Williams-White punch.
42" x 42" x 26" Wheeler planer.
36" Gisholt boring mill.
42" Bullard boring mill.
6" Jarecki pipe machine.
8" Williams pipe machine.
8 spindle Baugh drill.
32" Cincinnati shaper.
No. 5-B Brown & Sharpe miller.
No. 24 Toledo Cam drawing press.
14" x 66" Landis universal grinder.
26 and 35 K.V.A. Thompson spot welder.

Wm.C. Johnson & Sons Machy. Co.
1211 North 12th St. St. Louis, Mo.

BARGAINS USED MACHINES

- 1—No. 1 RYERSON High Speed Friction Saw, complete with all regular equipment.
 - 1—PELS Angle Bar and Tee Shear, Type BF-14, No. 147729.
 - 1—CRANE, 4-ton capacity, 20'6" span, 22' 0" overall length, CONCO Special Four Beam Motor Driven Underhung Type Traveling Crane, complete with two submerged Push Type "L" Trolleys from which are suspended a B-2-ton Lo-Hed Electric Hoist with drums mounted at right angles to bridge girders.
The above about 1½ years old.
Can be seen in operation.
- FROMENT & COMPANY
150 Bank Street, New York City

MAKE US AN OFFER

- 1—24" Gould Eberhardt Shaper (Excellent Condition).
 - 1—24" Gould Eberhardt Shaper (Excellent Condition).
 - 1—No. 3 Brown & Sharpe Univ. Miller (Excellent Condition).
 - 6—P. 3 S.B. Ferracuts Presses.
 - 1—P. 3 S.B. Ferracuts Press (Good Condition).
- HIGHWAY TRUCK PARTS CORP.
Indianapolis, Ind. Surplus Equipment Division.

FLANGER McCabe 1½"

West Penn Machinery Company
1208 House Bldg., Pittsburgh, Pa.

No. 3½B Bliss toggle drawing press
Draw and lift out 6"
No. 1½B Bliss toggle drawing press
Draw and lift out 5"
No. 1 Bliss toggle drawing press
Draw and lift out 3¼"
No. 2 Max Ams double seamer
No. 6 Becker vertical miller with rotary No. 3H LeBlond miller, vert. attach.
No. 70 Heald internal grinder
No. 2 Walker tool room grinder
16"x96" Landis plain grinder
21" Libbey full swing turret lathe
1¼" Gridley 4 spindle multiple

Above are samples of what we have.
Wire—write—or phone.

A. D. WHITE MACHINERY CO.

108 N. Jefferson St. Chicago

SHEARS: F.V. 55 Pels, capacity 5½" round 5" square cold Guillotine and other types, 1½" to 4" round.
PRESS BRAKE: No. 508 Loy & Nawrath wt. 28,000 lbs., 220 H.P. G. E. Synchronous Motor.
UPSETTERS: 1", 1¼", 1½", 2", 2½", 3", 4" and 5", Ajax and Acme.
BULLDOZERS: Nos. 1, 2, 3, 4, 7 and 9 Williams White.
BRADLEY HAMMERS: All sizes, helve and up-right.
Single and Double End Punch Presses.
PRESSES: Inclinable, solid back and straight sided.
BOLT HEADERS: Cold and hot, various capacities.
Bolt Trimmers, Tappers, Threading Machines and other bolt machinery.
DIE SINKERS: Nos. 2 and 3 Pratt & Whitney.
Complete 10", 4 stand, Rolling Mill, Break Down Mill, Rail Splitter and Roll Lathe.

DONAHUE STEEL PRODUCTS CO.
74th STREET AND ASHLAND AVENUE
CHICAGO, ILLINOIS

Practical Specialists in the Purchase and Resale of Bolt, Nut, Rivet and Forging Machinery

2 Frost, 9 ft. Pan Sand Mills

Good running condition. Complete with stock of spare parts and motors. Bargain. Change of sand handling layout reason for sale.

ADDRESS BOX G-527
care The Iron Age, 239 W. 39th St., New York.

FOR SALE DROP FORGING EQUIPMENT

Of Every Description

▲
SPLENDID VALUES,
INSPECTION INVITED
▼

RICHMOND FORGINGS
CORPORATION
RICHMOND, VA.

INDUSTRIAL PLANTS ROLLING MILLS and EQUIPMENT

FRANK B. FOSTER
829 OLIVER BUILDING PITTSBURGH, PA.
Cable Address FOSTER Pittsburgh

WELDERS BUTT - SPOT - SEAM

We are specialists in rebuilt welding machines.
Write us for our long list to select from.
TAYLOR-HALL WELDING CORP.
89 Hope Ave., Worcester, Mass.

AIR COMPRESSORS**ELECTRIC-MOTOR DRIVEN**

- 1—2350 cu. ft. WORTH fthr. valve.....3/60/2200
- 1—2033 cu. ft. ING.-RAND PRE-2.....3/60/2200
- 1—1584 cu. ft. CHGO. PNEU. OCE.....3/60/2200
- 1—1302 cu. ft. ING.-RAND PRE-2.....3/60/2200
- 1—1050 cu. ft. SULLIVAN.....3/60/440
- 1—808 cu. ft. CHGO. PNEU. OCE.....3/60/440
- 1—807 cu. ft. SULLIVAN.....3/60/440
- 1—676 cu. ft. WORTH fthr. valve.....3/60/440
- 1—627 cu. ft. CHGO. PNEU. OCE.....3/60/440
- 1—300 cu. ft. NAT'L BRAKE, 3-V8, 3/60/220/440

BELTED

- 1—1190 cu. ft. ING.-RAND XB-2, 22x12x16, Belt.
 - 2—1007 cu. ft. CHGO. PNEU. OCE, 19x11x12, Belt.
 - 1—888 cu. ft. ING.-RAND XB-2, 19x12x16, Belt.
 - 1—599 cu. ft. ING.-RAND XB-2, 16x10x14, Belt.
 - 3—528 cu. ft. ING.-RAND ER-1, 14x12, Belt.
 - 1—676 cu. ft. WORTH fthr. valve, 15x8½x12, Belt.
- Complete line of smaller sizes.

STEAM

- 1—517 cu. ft. ING.-RAND ORC-2.
 - 2—1530 cu. ft. ING.-RAND XPV-3.
 - 1—599 cu. ft. ING.-RAND X-2.
 - 1—386 cu. ft. CHGO. PNEU. NSS, 12x12x12.
 - 1—355 cu. ft. ING.-RAND PR-1, 12x12x10.
 - 1—1260 cu. ft. ING.-RAND XPV-3.
 - 1—1250 cu. ft. BURY XL.
 - 1—1156 cu. ft. ING.-RAND XPVR-3.
 - 1—823 cu. ft. ING.-RAND XPVR-3.
- Every unit guaranteed throughout when shipped.

A. G. Schoonmaker & Sons, Inc.
30 Church Street New York City
Shops and Warehouses—Jersey City, N. J.

Plate and Boiler Shop Tools

Accumulator, moving cyl. type, 1500 to 3500 lb. pr.
Air Compressor, Norwalk, 1250', 100 lb. press.
Boilers, H.R.T. 165 and 230 H.P., 125 lb. press.
Drills, Mult. Harrington, 6-spindle, 17' span, traveling stock table.
Drills, Vert., radial, wall and stationary.
Press, hyd. Banging, 28"x78" bed—4—6" steel coils.
Spinning Mch. for filing and dishing hds., ¾"x9" cap.
Lathe, Hendey, 20"x8", quick change, also other sizes.
Pipe machines, Bignall & K., 2½" and 6".
Punches & shears, L. & A. various sizes 6" to 56" throat, all heavy duty.
Rolls, plate, Southwark, 1½"x22' cap., drop end hous., power raising and lowering oper., motor dr.
Rolls, Niles, ¾"x12' cap., drop end housing, power raising and lowering operation.
Rolls, Hilles & Jones, ½"x8" cap., drop end housing.
Shaper, Hendey, 28" friction geared, 10" base vise.
Large stock of drills, grinders, pumps, stake riveters, engines, etc.

FARRELL MACHINERY COMPANY
1601 N. Eleventh St. St. Louis, Mo.

50 Belted Air Compressors

Ingersoll-Rand ERI—8x8 enclosed cap.....136'
Chicago 12x8 (60 lb.) open frame cap.....225'
Clayton and Union each 10x10 cap, each.....150'
Worthingtons, all feather valves and enclosed, 8½x10—175', 8½x12—200', 10x12—250', 14x12—555' (50 lb.), 4½x5 Vertical—23'.
Richmonds 25' and 50' single and twin enclosed.
4½x4½ sizes in following makes, Ingersoll, Curtis, Gardner, Westinghouse, etc., all enclosed, some air and water cooled, larger and smaller sizes.
Clifton Machinery Co., 1023 W. 6th St., Cin'ti, O.

ENGINE UNIT

1—440 K.W., 550 KVA. General Electric 3 ph., 60 cy., at present 2300 volts, will reconnect to 440 or 220 volts, direct connected to 16 & 32 x 36" Murray Iron Works Corliss, Cross Compound engine, speed 120 RPM. All complete including Surface Condensing equipment.

Archer & Baldwin, Inc.
126 Liberty St., New York, N. Y.

Telephone—Hitchcock 4545-4546-4547

- 1—300 H.P. Smith Gas Producer.
- 1—150 H.P. Rathbun-Jones Gas Engine. 100 K.W. Direct Connected Generator-Direct Current.
- 1—75 H.P. Rathbun-Jones Gas Engine 50 K.W. Direct Connected Generator-Direct Current.
- 2 Switchboards, complete, with Ammeters and Voltmeters.

This Power Plant is now running and has been used for a number of years with very good satisfaction. Will sell cheap.

LUMMIS AND COMPANY
146 N. Delaware Ave. Philadelphia, Pa.

VARIABLE SPEED**Motors—230 Volt D.C.**

H.P.	Speeds	Make	Type
1-200	500/1000	Allis Chal.	Interpole
1-100	250/700	Westgh. 3 Bear	SK-200
2-25/100	200/1200	Westgh.	SK
1-75/100	200/600	Westgh.	SK-210
1-75/100	500/1000	Cros-Wheeler	CMC-81H
2-30	225/450	Westgh.	SK-190
3-25/45	500/1500	Gen. Elec.	RLC-203
1-25/30	400/1200	Electro Dyn.	308
1-25	600/1200	Westgh.	SK-130
3-20/25	500/1500	Gen. Elec.	RF-12
5-15/20	500/1500	Westgh.	SK-110L
6-10	500/1500	Westgh.	SK
4-10/14	400/1600	Gen. Elec.	RLC-118
2-10	500/1000	Westgh.	SK-90
2-10	400/1200	Gen. Elec.-New	RF-10
7-1/2	450/1350	Gen. Elec.	LC
3-7/2	450/1800	Westgh.	SK-90
2-5/4	500/1500	Westgh.	SK-60
1-5	400/1600	Westgh.	SK-70
2-3	600/1800	Reliance	
6-1/2	En. L. 400/1600	Westgh.	SK



GET OUR PRICES
Large stock of FULLY GUAR-
ANTEED A.C. and D.C. MO-
TORS — GENERATORS —
TRANSFORMERS and ELEC-
TRICAL EQUIPMENT.

BELYEA COMPANY
Incorporated
147 West 18th St.
NEW YORK CITY

**ATTRACTIVE PRICES
BEFORE REMOVAL**

200 KVA, 220 volt, 3 phase, 60 cycle, Burke gen-
erator direct connected to Filer-Stowell Uniflow
engine.

676 cubic foot capacity Ingersoll-Rand Imperial type
10XCB, size 15" and 9 1/4"x12", 2 stage air
compressor, short belt idler drive with 100 H.P.
Synchronous motor.

Still on foundations

GENERATOR SETS

2-50 KVA, 220 volt, 3 phase, 60 cycle Ridgway
Generators, direct connected to Ridgway Engines.

1-500 KW 2300 volt, 3 phase, 60 cycle Turbo
generator set with condenser.

BOILERS

2-500 H.P. Heine Water Tube, 160 lbs. pressure,
A.S.M.E. code.

2-180 H.P. Keeler water tube, 200 lbs. pressure,
A.S.M.E. code.

1-150 H.P. 72"x18" hor. ret. tubular, 150 lb.
pressure, A.S.M.E. code.

2-125 H.P. Locomotive Portable, 125 lb. Press.
A.S.M.E.

HEATERS

2-1000 H.P. Cochrane open type Feed Water
Heaters.

O'BRIEN

Machinery Company

113 N. 3rd St., Philadelphia, Pa.

**ELECTRIC MOTORS
EVERY ONE A REAL
BARGAIN**

A few of the
thousand motors, generators,
transformers and Welder bargains in stock.

Direct Current Motors

220 volts Adjustable Speed

Hp.	Make	Type	Speed
75	Westinghouse	SK	450/900
30	Gen. Elect.	LC	270/300
15	Gen. Elect.	RF	450/2000
10	Gen. Elect.	LC	400/1600
7 1/2	Triumph	RF	450/2000
3 1/2	Gen. Elect.	RF	500/3000
3 1/2	Gen. Elect.	RF	600/1800
3	Gen. Elect.	RF	500/2000
3	Reliance C		600/1200

THE MOTOR REPAIR & MFG. CO.
1553 Hamilton Ave. Cleveland, Ohio

RANDLE

**OFFERS BIG BARGAINS
IN**

Used and Rebuilt Engine Generator Sets, Turbo
Generator Sets, Motors, Rotary Converters, Gen-
erators, Motor Generator Sets, Engines, Boilers,
Steam and Electric Machinery of all kinds, also
Machine Tools. Send for our new machinery list.
Yours for the asking. Established Over 50 Years.

**The RANDLE
MACHINERY CO.**

1772 Powers St., Cincinnati, O.

CRANES

The following are all high grade, available
for immediate shipment.

- 1-5 ton Box 60' span, 3-motors, 220-VAC.
- 2-5 ton Maris 60' span, 3-motors, 220-VAC.
- 2-10 ton Maris 60' span, 5-motors, 220-VAC.
- 2-10 ton Morgan 65' span, 230 VDC.
- 1-40 ton Shaw 80' span, 4-motors, 230-VDC.
- 1-60 ton Morgan 55' span, 4-motors, 230-VDC.

SPECIAL

- 1-Box crane, 95% new, 60' span, 10-ton cap. 2-
separate 5-ton trolleys, 220-VAC, wheel base
11'-0", hoist 30-F.P.M., trolley 125-F.P.M.,
bridge 325-F.P.M. (this is really a 15-ton crane).

T. B. MacCabe

2224-30 West Lippincott Street, Philadelphia, Pa.

A.C. and D.C. CRANES

50T. 50'; 30T. 72' and 25T. 75' Spans A.C.

15T. 50' Span—4 Mtr. 220 V. D.C.

2-5000 AMP. PLATING GENERATORS.

100-140T. 65' Span, 2 Trolleys—D.C.

12500 KVA. TURBO. 60 Cy.

3ph. with Sur. Cond. and Auxils.
ROSS POWER EQUIP. CO., Indianapolis, Ind.

LOCOMOTIVE CRANES

15-ton BrownHoist, 20 ton Indust-
rial, 25 ton Ohio—all 8-wheel 50-ft.
boom with or without 7 1/2 K.W. Gen-
erator and 45 in. Magnet.

FLAT CARS

8—80,000 lb. cap. 41-ft. long.
10—100,000 lb. cap. 41-ft. 6-in. long.

All steel, wood decks, A-1 condition.

HYMAN - MICHAELS COMPANY

Railway Exchange 20 N. Wacker Dr. Bldg.
St. Louis, Mo. Chicago, Ill.

**5-ton Harnischfeger 3-motor
110 Volt D.C. low head-room
Crane**

complete with Controllers, floor control, 22 ft.
span, high point from top of rail 19".

SCULLY-JONES & COMPANY
19th & Rockwell Sts., Chicago, Ill.

Cranes—Compressors

Compressors—458 ft., 610 ft. short belt dr.
Ing. Rand.

- 1-25 ton Ohio Loco. crane.
- 1-10 ton P & H crawler gas crane.
- 1-10 ton Osgood crawler gas crane.

J. T. WALSH

Brisbane Bldg., Buffalo, N. Y.

CRANE BARGAIN

10 ton Cleveland Traveling Crane, bridge span—
48'-6", 220 volt D.C. current, 8 H.P. Crocker-
Wheeler bridge motor, 8 H.P. Crocker-Wheeler hoist
motor, hand operated trolley, crane is operated from
floor.

Ideal for warehouse or similar intermittent service.
Price as is: \$850.00 f.o.b. Erie, Pa.

Erie Steel Construction Company, Erie, Pa.

TELEPHONE
BARCLAY 2793 **N.B. PAYNE & CO.** 25 CHURCH ST.
NEW YORK

CRANES**HOISTS**

Special—40-ton, 80-ft. span Shaw crane, 80% new
condition. See in operation.

5, 10, and 15-ton long span cranes, A.C. and D.C.

A.C.—OVERHEAD TRAVELING CRANES—D.C.

40-Ton Northern, 10-ton auxiliary, 4-motor, practi-
cally new, 47' 1 1/4" span, 220 volts D.C.

25-Ton Cleveland, 4-motor, brand new, cage control-
led, span to suit, 220-440 volts, 3 ph., 60 cycle.

10-Ton Niles or Shaw, 3-motor, good condition, cage
controlled, 50' 4" span, 220-440 volts, 3 ph. 60 cy.

5-Ton Niles Crane 3-motor, cage controlled, span
to suit, 220 volts D.C. or will sell trolley alone.

1-Ton Brown Hoist, 3-motor, 29' 0" span, cage con-
trolled, 220 volts D.C.

James P. Armel, 323 Fulton Bldg., Pittsburgh, Pa.

LIFTING MAGNETS
45" E C & M 30" Ohio
43" C H 18"x52" C H
18" C H
All of these magnets are guaranteed
Goodman Electric Machinery Co.
1080 Broad St., Newark, N. J.
Note new address

This is the
PLACE
where you save
TIME
and MONEY

Here is where Friends,
Competitors, and
Strangers Get Together,
Actuated by the Univer-
sal Urge to *Save Money,*
Save Time, Strike a Bar-
gain. That is why these
pages are productive of
sales. It is simply a
case of displaying mer-
chandise to a crowd of
shoppers — because the
men who read them are
in the market to buy.

Advertise your own sur-
plus materials, machin-
ery, motors, etc., in the

**CLEARING
HOUSE
SECTION**

HOISTS

5—American two drum and swinger, with 37 H.P. 60 cycle, 3 phase, 220-440 volt, slip-ring motors, in prime condition.

PUNCHES and SHEARS

L & A No. 2 Double \$1200
H & J No. 5 Single 1000

F.O.B. Car Connecticut Shipment

Mallory Machinery Corp.
Baltimore, Md.

Second Hand Williams Bucket

Williams ½ Yd. Bucket, Rehandler type, without teeth. Weight—2250 lbs. Bucket is in good condition.

Price: \$300.00 f.o.b. Erie, Pa.

ERIE STEEL CONSTRUCTION COMPANY
Erie, Pa.

SATISFACTION

ALBERT PIPE SUPPLY CO., INC.
NEW-RECLAIMED-USED

PIPE

ALL SIZES CUT TO SKETCH
AND STOCKED

BERRY & NORTH 13th STS.
BROOKLYN, N.Y.

GUARANTEED

SERVICE PRICES

Second Hand **PIPE** New Threads
Black & Galv. & Couplings.

Special Price—2" Black

L. & D. PIPE SUPPLY CO., INC.
1100 Flushing Ave., Brooklyn, N. Y.

PIPE NEW

SECONDHAND
Overhauled and Tested
New Threads and Couplings
Established 1904

Albert & Davidson
Pipe Corp.

2nd Ave., 50th-51st Sts.
Brooklyn, N. Y.

Second Hand **PIPE** Overhauled
Wrought Iron Rethreaded
and Steel Coupled

All Sizes in Stock
Greenpoint Iron & Pipe Co., Inc.
187-189 Maspeth Avenue, Brooklyn, N. Y.

If **PIPE** Second-hand
try us. All sizes any quantity. Pipe cut and threaded to any length. Your inquiry means another satisfied customer.

HUDSON PIPE & SUPPLY CO.
32nd St. & C. R. R. of N. J.
Bayonne, N. J.

15 MILES 20 lb. 24" Gage Portable Track

15 ft. sections, on Steel Ties.
Or will sell the

20 lb. RAIL

or Ties separately.

Low Price—Quick Shipment.

ZELNICKER IN ST. LOUIS

STEEL PILING A SPECIALTY, RAILROAD & CONTRACTORS EQUIPMENT, CRANES, SHOVELS, BOILERS, OIL ENGINES, COMPRESSORS, TANKS, PIPE, ETC.

RAILS

New
Relaying

TRACK MATERIALS
FROGS & SWITCHES

*Write or phone your inquiry
at our expense*

**The PERRY BUXTON
DOANE COMPANY**
1010 Pennsylvania Bldg.,
Philadelphia, Pa.

500 tons ASCE 60 lb. Rail
2000 tons ASCE 85's

Other sections also in stock. Inquiries solicited, prices cheerfully quoted.

M. K. FRANK

220 East 42nd St.
New York, N. Y.

Clark Building
Pittsburgh, Pa.

RAILS

TRACK MATERIALS RAILWAY EQUIPMENT
E. C. SHERWOOD 48 Church St.
New York

Tel. Nos. Cortland 3322-3323

RAILS

ALL TRACK ACCESSORIES
NEW and RECONDITIONED

CHICAGO PITTSBURGH
BUFFALO
INDIANAPOLIS HARRISBURG

MORRISON
RAILWAY SUPPLY CORP.

50,000 TONS***RELAYING and new RAILS****STANDARD SECTIONS**

Sizes—12 lbs to 130 lbs.

*Prices—Will stimulate your
choice in a competitive
market.*

*Shipment—Same day your
order is received. Can ship
at same time Angle Bars and
Splice Bars, Bolts and Nuts,
Spikes, Tie Plates, Frogs,
Switches, etc.—all properly
fabricated and matched so that
you can lay track promptly.*

** Foster Relaying Rails are
thoroughly reconditioned by ex-
perts using machinery especially
designed for this purpose.*

*All material unconditionally
guaranteed—subject to your
inspection and approval at
destination.*

Phone, write or wire for quotation.



L.B. FOSTER COMPANY
PITTSBURGH • NEW YORK • CHICAGO

WAREHOUSES AT CONVENIENT POINTS

RELAYING RAILS

All Sections

Continental Iron & Steel Co.
33 Rector Street New York, N. Y.

Louis Cohen & Son
IRON—STEEL—SCRAP
RELAYING RAILS

WE DISMANTLE PLANTS

Office: Wilkes-Barre, Pa. Yards: Wilkes-Barre, Pa. Buttonwood, Pa.

THE PERRY BUXTON DOANE CO.
IRON—STEEL—SCRAP
DISMANTLING

OFFICES: Boston Philadelphia So. Boston Providence
New York Hartford Cantonville Worcester
Portland

100—50 Tons Capacity
**ALL STEEL HOPPER
DUMP ORE CARS**

*In Splendid Condition
Lowest price in years*
DULUTH IRON & METAL CO.
Duluth, Minn.

We Want To Buy

WANTED

1200 Lb. Chambersburg or Billings
& Spencer Board Drop Hammer
in good condition.

The Wilcox, Crittenden & Co., Inc.
Middletown, Conn.

TUBING

Seamless and Welded Steel Tubing
Steel Pipe

Mail us your surplus lists.

ADDRESS BOX C-905
Care The Iron Age, 239 W. 39th St., New York.

RAILING FITTINGS

We are in the market for second-hand malleable iron railing fittings, $\frac{3}{4}$ " and 1". For information get in touch with

A. SACKIN
456 W. 39th St. New York, N. Y.

NATIONAL HEADER

automatic feed 1" continuous or $1\frac{1}{2}$ " stop motion.

GANTRY CRANE

20 to 50 tons capacity.

HENRY POTTS & CO.
Bankers Trust Building,
Philadelphia, Pa.

Steel Shelving

in good condition for pipe fittings and small parts.

TAYLOR FORGE & PIPE WORKS
P. O. Box 485—Chicago.

Profit by using

THE CLASSIFIED
SECTIONS

of The Iron Age

Contract Work

SPECIAL MACHINERY

TOOLS—MACHINE PARTS

We operate a large plant devoted exclusively to above work and have every facility necessary in equipment and engineering experience.
Correspondence Solicited

C. H. Cowdrey Machine Co.
30 Summer St.
Fitchburg, Mass.

TO YOUR DESIGN

Machinery built with the same degree of accuracy as we put into our own Product.

THE WATSON-STILLMAN CO.
71 West St., New York

HIGH CLASS MACHINE WORK

We have capacity for a limited amount of additional medium weight machine work requiring accuracy. Pieces up to 5 tons.

JOHN J. CAVAGNARO
ENGINEERS Established 1881. MACHINISTS
6th ST. HARRISON, N.J. 257 CENTRE ST., N.Y.C.

SPECIAL MACHINERY

BORING MILLS

(Up to 16 feet)

LATHES

(Up to 42 inches x 30 feet)

PLANERS

(Up to 60 inches x 20 feet)

MILLING MACHINES

Of All Descriptions

We have facilities to build machinery and are prepared to furnish proposals on parts or complete machines. We offer the services of our competent staff of designing Engineers for your problems.

GRAY IRON AND
SEMI-STEEL CASTINGS

(Up to 15 tons)

Catering especially to the machine tool trade. Your inquiries will receive prompt, careful attention.

The Hill Clutch
Machine & Foundry Co.
6403 Breakwater Ave., N. W.
CLEVELAND, OHIO

SPECIAL MACHINERY DESIGNED DEVELOPED MANUFACTURED

MACHINE PARTS — TOOLS
JIGS AND FIXTURES


THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD, CONN.
SPECIAL MACHINERY DESIGNED AND BUILT

24 HOUR SERVICE SINCE 1903
LAMBERT & TODD MACHINE CO.
Manufacturers of LEHIGH CLUTCH
SPECIAL MACHINERY DESIGNED AND BUILT
Production Work Wanted
115-17 Federal Street, Camden, N. J.
Marine Work Solicited

Contract Machine Work

Parts and Complete Machines. Heat Treating and Grinding. Mail Blue Prints for Quotations.

GENERAL MACHINE WORKS
York, Pa.

Your Inquiries Solicited

For
Special Machine Work in large or small quantities.
Special Machinery to your specifications.
Machine Development Work.

Our mechanics are especially skilled in building automatic and semi-automatic machinery, and our machine equipment and handling facilities are complete.

We are especially well equipped for large production, milling, planing and drilling. Let us quote you on your requirements.

THE MAX AMS MACHINE CO.
BRIDGEPORT, CONN.

MACHINE PARTS

Made from Pipe; Spacers, etc.
Threading, Drilling, Turning, etc.
Large or small quantities.

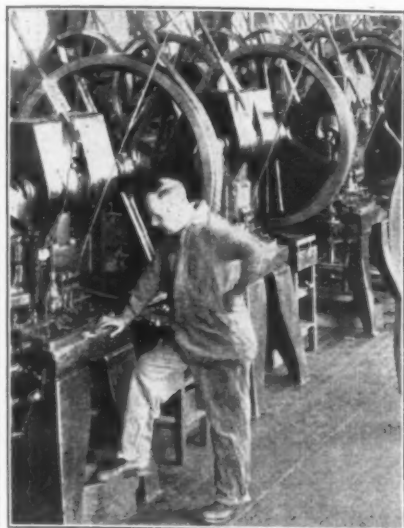
Fabricated Steel Products Co.
Wheeling, W. Va.

Profit by using
THE CLASSIFIED
SECTION
of the IRON AGE

THE H. C. COOK CO.

For 25 years located in the center of Brass Industry—Specializing in Metal Stampings and Screw Machine parts—Expert tool makers and modern shop facilities at your service. Address

38 Beaver St., Ansonia, Conn.



47 open back presses comprise part of our extensive contract equipment.

STAMPINGS

Complete design, assembly, packaging service on contract work.

The Beardsley & Wolcott Mfg. Co.
Contract Division
Waterbury, Conn.

PRESSED METAL Stamped and Drawn Parts to order

"Made from Stanley Steel"

THE STANLEY WORKS
Pressed Metal Division
New Britain, Conn.
New York, Chicago, Philadelphia, Detroit
San Francisco, Los Angeles, Seattle

WE CAN MAKE IT

Let us make your stampings, sheet metal working dies, jigs, fixtures, tools, etc.
Our work is right—our price is right.

General Machine & Manufacturing Company
544 Iranistan Ave., Bridgeport, Conn.

**METAL STAMPINGS and
GRAY IRON, BRONZE
and BRASS CASTINGS**
furnished in the rough, nickel and brass plated.
THE N. N. HILL BRASS CO.
East Hampton, Conn.
Established 1889

STAMPINGS

Light and Medium
Electric Spot Welding and
Assembled Units
We specialize in designing stampings to substitute castings. Dies designed and built for quantity production.
Eastern Tool & Stamping Co., Inc.
30 Ballard Street, Saugus, Mass.

COLD ROLLED PRESTEEL STRIP
DEEP DRAWING
STAMPINGS ALL METALS
DIFFICULT FORMING
WORCESTER PRESSED STEEL CO.
WORCESTER MASSACHUSETTS

Light Metal Stampings
We specialize in light stampings of all kinds—any quantity—no delays. Just give us your specifications and we deliver the goods. Expert tool and die makers. Try us.
Patent Specialty Supply Co., Inc.
FURNACE ST.
Est. 1897 CAMBRIDGE, N. Y. Inc. 1916

ALLEGHENY METAL

Specialists in welding and fabricating sheet steel up to $\frac{3}{4}$ " thick, Allegheny Metal, and other corrosion resisting alloys.

Baked Enamel or Lacquer Finishes on all metals. We originate or re-design. Bring us your problem.

"SAVE WITH STEEL"

**PRESSED & WELDED
STEEL PRODUCTS CO.**

38-59 11th St. nr. 40th Ave. L. I. City, N. Y.

Stampings

Facilities above the average.
Write us for quotations.

Great Lakes Pressed Steel Corp.
1410 Niagara St. Buffalo, N. Y.

SHEET METAL WORK

Send prints for estimates on all kinds of sheet metal work; riveted or welded construction up to $\frac{3}{8}$ " plate; also metal spinning.

KELKER BLOWER CO., INC.
19 Bush St. Buffalo, N. Y.

Manufacturing for Others Since 1869 Metal Goods—Special Machinery

Production facilities for stamping, press work, machining, welding, japanning, assembling and sheet metal work.

E. Behringer Sheet Metal Wks., Inc.
108-122 Jabez St. Newark, N. J.

METAL STAMPING

Designing and Manufacturing

**TOOLS—DIES
SPECIAL MACHINERY**

Penn Jersey Metal Products Corp.
Newton Ave. and Line St., Camden, N. J.

Metal Stampings

**HARDWARE SPECIALTIES
ASSEMBLIES**

HUEBEL MFG. CO., INC.
103 MONROE ST. NEWARK, N. J.

SHEET METAL SPECIALTIES METAL STAMPINGS

Have additional capacity to manufacture on contract, quantity orders of sheet metal parts.

L. D. BERGER CO.
51 N. 2nd St., Philadelphia, Pa.

STAMPINGS

and

PRESS WORK—HOT or COLD

With a Service That Satisfies

DAVIS BRAKE BEAM CO.
Johnstown, Pa.

STAMPINGS—DIES

Let us manufacture your

SHEET METAL SPECIALTIES
Acme Stamping & Mfg. Co.
Send us your samples or drawings for prices
Corliss & Rudd Sts., Pittsburgh, Pa.

WANTED

to Manufacture:

PATENTED Specialties in Sheet Metals. Electrical Appliances; Automotive Accessories; Radio Parts; fine Builders' Hardware; or similar fields. Long established corporation with ample resources and well equipped plant, with large and varied press equipment and unusual finishing facilities, is desirous of co-operating with inventors or sales organizations needing manufacturing assistance. Competent Engineering staff will assist in development of articles of real merit. Fair treatment assured.

ADDRESS BOX 7304-A

care The Iron Age,

1507 Otis Bldg., Chicago, Ill.

**Punch Press—Screw Machine Parts
Gear Cutting
Hardened and Ground Material
Heat Treating**

BURGESS-NORTON MFG. CO.
553 Peyton Street, Geneva, Ill.

Hydraulic Press Work

Any Size or Thickness

Structural and Plate Fabricating

Job Machine Work

Inquiries Solicited

Youngstown Steel Car Corp.
NILES, OHIO

HYDRAULIC PRESSINGS

Heavy and Light

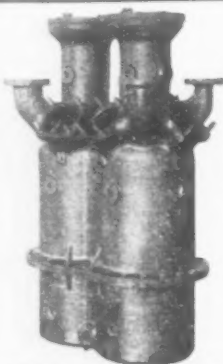
Inquiries Solicited
for the Manufacture of
Structural and Steel
Plate Patented Specialties

PENNSYLVANIA CAR COMPANY
Kansas City, Kansas

SHEET METAL WORK

Black and galvanized sheet metal products for every industrial use. Send blue prints for estimates on special jobs. Address Dept. V.
Steel Buildings, Skylights, Ventilators, Decking

SAINT PAUL CORRUGATING CO.
3-23 WEST WATER ST. SAINT PAUL, MINN.



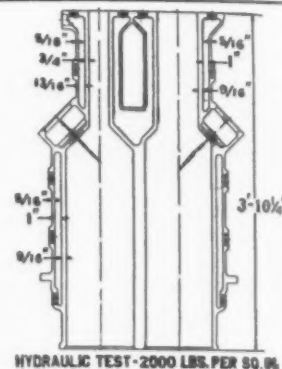
We specialize in
DIFFICULT CASTINGS

UP TO 10 TONS IN ONE PIECE
OF IRON AND SEMI STEEL

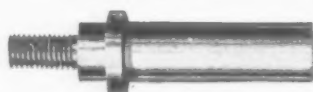
We build special machinery for precision work.

ELECTRIC BOAT CO.

NEW LONDON SHIP AND ENGINE CO. WORKS
GROTON, CONN.



HYDRAULIC TEST-2000 LBS. PER SQ. IN.



**SCREW MACHINE
PRODUCTS**

of
ALLOY AND
COLD ROLLED STEEL
Up to 2 1/4" Dia.

EXCELLENT DELIVERY

*We Are Expert
Heat Treaters*

**STANDARD
PRESSED STEEL COMPANY**
Box 523
Jenkintown, Pa.

NICKEL and CHROMIUM ALLOYS
of
GREY IRON

Machinability—Wear—High Strength
Heat Resisting

The TURNER & SEYMOUR MFG. CO.
Torrington, Conn.

ON QUANTITY PRODUCTION
LIGHT GREY IRON CASTINGS
WE GUARANTEE

**QUALITY, SERVICE
LOW PRICES**

THE CONNECTICUT FOUNDRY CO.
Rocky Hill, Ct.

Buffalo Bronze Die Cast Corp.

100 Arthur St., Buffalo, N. Y.

SPECIALISTS IN
Aluminum Bronze Die Castings
Chilled Tin Bronze Castings
Brass and Aluminum Castings

IRON AND STEEL WORKS

In Middle Western Canada open to manufacture in
Canada for American concerns.

Have well equipped steel, iron and brass foundry,
pattern, machine, blacksmith, boiler, tank, structural
and ornamental iron shops.

Highest Banking and Mercantile references. If
interested.

ADDRESS BOX E-675
care The Iron Age, 239 W. 39th St., New York.

**Gray Iron and Semi-Steel
Castings**

Charcoal "Mayari" and low phos. mixtures.
Quality castings for machinery, blank gears,
dies, piston rings, etc. Up to 1 1/2 tons.

Penn Foundry & Mfg. Co.
Reading, Pa.

BRASS AND BRONZE CASTINGS

1 lb. to 2000 lbs.

Capacity 16,000 lbs. per day

OUR SPECIALTIES

WORM AND GEAR BRONZE, BRIDGE
BRONZE, ACID PROOF BRONZE,
BRONZOX BUSHINGS AND BARS.

A. W. CADMAN MFG. CO Pittsburgh, Pa.
Established 1860

Grey Iron Castings

*of all descriptions
our own pattern
and machine shop.*

EYSTER, WEISER CO.

Established 1832
YORK, PA.

**Small Grey Iron Castings
(SOFT)**

For quantity production: easily machined.
Nickel chromium or manganese alloys if de-
sired. Estimate?

KLINE HARDWARE CO.
Allentown, Pa.

DEPENDABLE

Gray Iron, Semi-Steel
Brass & Aluminum

CASTINGS

Adequate shop facilities, extensive experi-
ence, with the ability to take care of your
pattern and machining requirements, put us in
position to guarantee satisfaction on any job
we undertake. Prices will be right, also.

**YORK FOUNDRY AND
MACHINE CO. PENN.**

Let Us Make Your

**GREY IRON
CASTINGS**

and Do Your

MACHINE WORK

on Contract

WE KNOW HOW

Would Appreciate Opportunity of Quoting

**ROYERSFORD FOUNDRY &
MCH. CO.**
ROYERSFORD, PA., U. S. A.

SCREW MACHINE PRODUCTS
Metal Parts and Assemblies
Good Uniform Quality

THE NEWTON Mfg. Co.

125 West Main St.
Plainville, Conn.

**SCREW MACHINE
PRODUCTS**

ALL SIZES

Complete Finishing Facilities

HARTFORD MACHINE SCREW CO.
Hartford, Conn.

**SCREW
MACHINE
PRODUCTS**

Small
and Large
Quantities
Capacity 3"

PENN SCREW & MACHINE WORKS
708-12 Cherry St., Philadelphia, Pa.

Luers Bros. Machinery & Tool Co.
1920 Rivard St., Detroit Mich.

*Producers
of*
SCREW MACHINE PRODUCTS

ANDES, INC.

LANCASTER PA.

Light and Medium Gray Iron
Machinery Castings.

In the rough or machined.

ANNOUNCING

"Abcoloy" Bearing Bronze

*Send Your Specifications and Stop
Your Bearing Troubles Today*

The ATLAS BRASS FOUNDRY CO.
COLUMBUS, OHIO

Profit by using

**THE CLASSIFIED
SECTIONS**

of The Iron Age

Parkersburg
HIGH TEST ALLOY
GREY IRON, ALUMINUM
AND BRASS
CASTINGS
THE PARKERSBURG
RIG AND REEL CO.
QUALITY
AND
SERVICE
FOUNDRIES
POMEROY, OHIO

HEADED WORK SMALL METAL PARTS

Whatever you need—small, standard, or patented parts—we can produce for you.

The design of such parts is held in the strictest confidence—tell us your needs.

JOHN HASSALL, INC.
EST. 1850
CLAY and OAKLAND STS., BKLYN, N. Y.

HOT DIP GALVANIZING

We have the largest hot dip galvanizing plant and kettles in the United States. We have the most modern equipment to do first class galvanizing at lowest prices.

Prime Western Zinc used exclusively. Galvanized products furnished.

Send Us Your Inquiries

Joseph P. Cattie & Brothers
Gaul and Letterly Streets
Philadelphia

WOOD and METAL PATTERNS

Aluminum Matchplates

Send Blueprints for Estimates

BASCOM & CO., Troy, N. Y.
Established 95 Years

DROP FORGINGS

We are in a position at this time to name some mighty attractive prices and delivery. Any size from any steel. Allowing us an opportunity to quote will not be regretted.

W. P. PAUL CO., PHILA, PA.

REGRINDING

We regrind metal cutting band and hack saws and guarantee them to do more work than new blades at less than half cost. One saw ground free as proof.

BIRMINGHAM GRINDING WORKS
1808 P. O. Court, Birmingham, Ala.

Business Opportunities

PEREMPTORY LIQUIDATION SALE

FULLY EQUIPPED MODERN STEEL ROLLING MILL

OF

PENN SEABOARD STEEL CORPORATION
NEW CASTLE, DELAWARE

APPRAISED AT OVER \$3,000,000.00

COMPRISING: VALUABLE LAND AND BUILDINGS ON DELAWARE RIVER, 350 FT. WHARF; 14,600 LINEAL FEET OF RAILROAD SIDINGS, SERVED BY PENNSYLVANIA RAILROAD.

EQUIPPED WITH: 34" NATIONAL ROLL & FOUNDRY BLOOMING MILL; 8" x 8" HOT SHEAR; 16", 13" AND 12" ROUGHING AND FINISHING MILLS; 150 TON CAPACITY OPEN HEARTH FURNACES AND CHARGERS; 16 ELECTRIC TRAVELING CRANES; STEEL BUILDINGS; ELECTRIC GENERATORS; ROTARY CONVERTERS; TRANSFORMERS; COMPLETE MACHINE AND PATTERN SHOPS; AND OTHER EQUIPMENT.

Illustrated Catalog on Request

PENN SEABOARD CORPORATION

FRANKLIN TRUST BUILDING
PHILADELPHIA, PA.

CHARLES KRISER, SALES MANAGER

WANTED TO LEASE OR BUY IRON FOUNDRY

in Newark or vicinity. Give full particulars.

ADDRESS BOX G-502
care The Iron Age, 289 W. 39th St., New York.

FOR SALE

In High Point, N. C., a completely equipped foundry, machine shop and pattern shop, now in operation. Fine location; substantial buildings; very reasonable price. Apply to L. U. Noland, Newport News, Va.

FOR LEASE

Foundry building located at Aurora, Illinois, containing over 17,000 square feet, with additional buildings suitable for foundry work or other industry.

J. B. LAMSON
547 W. Jackson Blvd., Chicago, Ill.

OPPORTUNITY

Well established machinery manufacturer with comprehensive plant and yearly volume of business exceeding \$300,000 will entertain proposal for consolidation with a financially responsible concern having a specialized mechanical line, who are in position to combine with us and take over operation of plant.

Our continued activities in an associated line will help increased yearly sales volume. Individuals possessing same requirements and ability to operate plant will be considered. Location Philadelphia District. Principals only.

ADDRESS BOX G-508

C/o The Iron Age, 239 W. 39th St., New York

FOR SALE

Factory Building, 55'x150' located on approximately one acre of ground. Has concrete floor, is well lighted and can have P.R.R. connection. Equipped with heating plant. Location Southern Pennsylvania.

ADDRESS BOX B-434

Care The Iron Age, 239 W. 39th St., New York.

SALES EXECUTIVE WANTS TO PURCHASE SUBSTANTIAL OR CONTROLLING INTEREST IN GOING PROFITABLE MANUFACTURING BUSINESS. GIVE FULL DETAILS AND INVESTMENT DESIRED.

ADDRESS BOX G-529.

Care The Iron Age, 239 W. 39th St., New York

A well established Chicago corporation manufacturing machinery, tools and metal specialties made an actual profit of over \$100,000 last year, most of which went into additional equipment and promotion of the business. We now wish to increase our working capital slightly, and offer to five mechanical executives who can reciprocate, and who have \$2,000 cash, an interest in this business. **ADDRESS BOX G-463.** Care The Iron Age, 239 W. 39th St., New York.

DROP FORGING MANUFACTURER desires services of manufacturers representative who is in contact with trade using forgings made on eight hundred to twenty-five hundred pound hammers.

Must be able to produce results. Territory, New York, Pennsylvania, New England. Reply stating qualifications, past experience and territory you are traveling.

ADDRESS BOX G-515

Care The Iron Age, 239 W. 39 St., New York.

We can offer valuable contracts to sales representatives calling on users of heavy pressed, finish machined or rough machined forgings, die blocks, etc. New England, upper N. Y. State, Philadelphia, Cleveland, Indianapolis, St. Louis and Pacific Coast now open.

ADDRESS BOX G-465

Care The Iron Age, 239 W. 39th St., New York.

MANUFACTURER'S REPRESENTATIVE

With established office and twenty years sales experience in dealing with Mills and Plants desires a good mechanical account for Pittsburgh District. Highest reference.

Address Box A-829

Care The Iron Age, 1319 Park Bldg. Pittsburgh, Pa.

REAL ACTIVE REPRESENTATION is offered by sales organization covering New York Metropolitan area past eight years, to manufacturers of special shop equipment, tooling, etc., on exclusive sales and commission basis. Men with technical and varied shop experience that can produce results.

ADDRESS BOX G-522

Care The Iron Age, 239 W. 39th St., New York.

Patented Specialties

We are looking for patented specialties of sheet metal to manufacture. We solicit inquiries from inventors or sales organizations. Facilities unusually complete. Our Engineering Department is at your service.

STOLPER STEEL PRODUCTS CORP.
3302 Fond du Lac Avenue, Milwaukee.

—ATTENTION—**American Manufacturers****Do You Contemplate Establishing A Canadian Branch Plant?**

Why not give us an opportunity to manufacture for you, until your requirements warrant a separate Plant investment?

We have excess manufacturing capacity.

HAMILTON, Ontario, where we are located, enjoys exceptional distributive facilities.

We produce all kinds of ALUMINUM, ZINC, and WHITE METAL DIE CASTINGS by DOEHLER PROCESS—also all kinds of BRASS, BRONZE and ALUMINUM FOUNDRY CASTINGS.

LIGHT STAMPINGS — LIGHT MACHINE WORK and SPINNINGS.

Also, COPPER ZINC, CADMIUM, NICKEL and CHROMIUM PLATING WORK.

Please address—

**General Manager,
BOX G-274**

Care The Iron Age, 239 W. 39th St., New York.

Well Established Rolling Mill

has extra capacity available in New York district. Work desired to fill schedule on mill now running part time.

Address Box G-505

Care The Iron Age, 239 W. 39th St., New York

Responsible Michigan machinery manufacturer, having modern shop, efficient organization and low cost operation desires build medium size machinery for others. Might invest or help market, but primary interest is manufacturing and we know how.

ADDRESS BOX G-531

Care The Iron Age, 239 W. 39th St., New York

INVENTORS

Household Specialties, Auto Accessories and parts, made of sheet metal or die castings, wanted for manufacture and sale on royalty or outright purchase by nationally known manufacturer. Inventions patented or patent pending only.

Box 549, Middletown, Conn.

—DEPENDABLE—

APPRAISALS

(Qualified Experts in all lines)

Standard Appraisal Company

New York, Chicago, Boston, Atlanta

PATENTS

Expert on metal products and metallurgical patents. Examiner U. S. Patent Office for 16 years.

JOHN BOYLE, Jr.—Patents

201 Ouray Building Washington, D. C.

TREASURY DEPARTMENT. Office of the Supervising Architect, Washington, D. C., September 17, 1930.—SEALED BIDS will be opened in this office at 3 p. m., October 29, 1930, for the annex, extension and remodeling (except elevators) of the U. S. post office, court house, etc., at Albuquerque, N. Mex. Drawings and specifications, not exceeding six sets, may be obtained at this office in the discretion of the supervising architect by any satisfactory general contractor, and provided a deposit of \$50.00 is made for each set to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States, JAS. A. WETMORE, Acting Supervising Architect.

ALL KINDS of Opportunities are Presented HERE

It has become a habit with executives in the metal trades field to turn to this section for opportunities in business, capital, industrial real estate, inventions, new products. This is the habit which makes these pages effective for your purposes. You will find their cost low.

USE THEM

Employment Exchange

HELP WANTED

SUPERINTENDENT or GENERAL FOREMAN, with experience in sheet metal layout and fabrication. Must be able to take entire charge of shop from the layout from drawings to the production of the finished article. Record of results necessary, which please state with experience and salary wanted in first letter. Position available immediately. Address Box G-517, care *The Iron Age*, 239 W. 39th St., New York.

GENERAL SUPERINTENDENT — Thoroughly experienced in plant layout and operation of large bridge, structural and tank fabricating plant wanted for service in Russia. Applicant must be able to select his own assistants to install and operate the various sub-divisions of the plant under his general direction. Give full record of past experience, references and state when available. Address Box G-492, care *The Iron Age*, 239 W. 39th St., New York.

HIGH-GRADE EXPERIENCED pattern storage and pattern layout man, able to read complicated blue prints and lay out patterns to suit. Must be familiar with modern foundry practice on heavy machinery. Location Massachusetts. State name, address, age, experience, salary expected, also names and addresses of employers last 10 years and length of service with each. Address Box G-532, care *The Iron Age*, 239 W. 39th St., New York.

SALES REPRESENTATIVES who can produce to complete our sales organization in Exclusive Open Territories; commission only. Syrosil is an established refractory lining for Industrial and Steam Boiler Furnaces used by Studebaker and other large firms. It is infusible at 3400 deg. F., resists slag and iron oxide. Syrosil Company, Elkhart, Ind.

FACTORY SUPERINTENDENT for plant making sheet metal cabinets. One with successful record and experience in modern shop practice in production and assembly. State in first letter, complete details of experience together with salary wanted and when available. A good job for the right man. Address Box G-516, care *The Iron Age*, 239 W. 39th St., New York.

SALES ENGINEER—Technical graduate, age 25 to 35, to sell grey iron castings, pig molds, melting pots, etc., to non-ferrous and die casting trade. Must have experience in this line or closely allied line. State age, qualifications, references, salary expected. Address Box G-526, care *The Iron Age*, 239 W. 39th St., New York.

SALESMEN on commission basis only to sell the Guibert Togglebug Drill. Prefer men selling tools or machinery to structural fabricators. Prefer men in cities Los Angeles, San Francisco, Seattle, Portland, Memphis, Kansas City, Dallas and the South. Address Guibert Steel Company, P. O. Box 1037, Pittsburgh, Pa.

SALES REPRESENTATIVE in Chicago District to sell metal stampings and die castings and contracts to manufacture for nationally known company. Box 549, Middletown, Conn.

EMPLOYMENT SERVICE

POSITIONS OPEN

for Works Managers; Superintendents; Foremen; Mechanical, Electrical, Metallurgical and Chemical Engineers; Draftsmen, Sales and Office Executives. No advance charges. Confidential.

H. H. HARRISON, Inc.

A Personnel Agency

20 W. JACKSON BLVD., CHICAGO, ILL.
17 Years of Employment Service Experience

EMPLOYMENT SERVICE

When General Managers, Sales Managers, Works Managers, Chief Engineers, Factory Managers, Superintendents, Metallurgists, Comptrollers, Treasurers and other important men in the metal-working industries can be better served in making new connections than they have been for 12 years by us, this organization will be selected for the task. Businessmen in the metal-trades you want to reach know us and believe in us. Not an employment agency. **JACOB PENN, Inc., 535 Fifth Avenue, corner 44th Street, New York City.**

SALARIED POSITIONS \$2,500 to \$25,000

If you are qualified for position between \$2,500 and \$25,000, and are receptive to negotiations for new connection, your response to this announcement is invited. The undersigned provides a thoroughly organized service, established twenty years ago, to conduct confidential preliminaries and assist the qualified man in locating the particular position he desires. Not a registration bureau. Retaining fee protected by refund provision, as stipulated in our agreement. Send name and address only for description of service. **R. W. Bixby, Inc., 274 Main St., Buffalo, N. Y.**

\$3,500 TO \$25,000 POSITIONS

MARKET YOUR services through our confidential correspondence with prospective employers. High grade openings located sometimes 24 to 72 hours after letters are mailed. A valuable medium for establishing contacts in all lines. Nominal ADVANCE fee for compiling lists, postage, etc. Bonus paid when finally placed. Write or call.

BERNARD SERVICE

Dept. A, 101 W. 37th St., New York.

POSITIONS in all branches of the Iron, Steel and Allied Industries may be obtained through our efficient Employment Service. Personnel Extension Bureau, 917 Equitable Bldg., Baltimore, Md.

SITUATIONS WANTED

EXECUTIVE AVAILABLE, HARD JOB DESIRED, ENGINEERING TRAINING, EXCELLENT ORGANIZER, WAGE INCENTIVE PLANS USED, SALES MANAGEMENT, WAREHOUSING, SERVICE, FINANCIAL AND SHOP EXPERIENCE. AGE 36, HEALTH PAR PLUS. WHITE COLLAR POSITION NOT NECESSARY. ADDRESS BOX G-445, CARE THE IRON AGE, 239 WEST 39TH ST., NEW YORK.

OUTSTANDING SALES EXECUTIVE—Offering fifteen years' experience in manufacturing and sales promotion, covering practically every state east of Mississippi River. Experienced in electric welded steel, copper and brass tubing, foundry practice and kindred lines. Knowledge of business organization and financing. Welcomes through investigation of past accomplishments and references. Chicago residence. Address Box G-519, care *The Iron Age*, 239 W. 39th St., New York.

SITUATIONS WANTED

MANUFACTURING EXECUTIVE—Practical mechanical engineer, with thorough knowledge of design, foundry, machine and tool practice, the buying of all kinds of materials with the best system of efficiency, planning, routing and cost with a thorough understanding of labor, of handling a large number of men—a man of keen executive and organizing ability, capable of throwing immediate speed and accuracy into production to make things pay. Available on short notice. Location immaterial. Address Box G-412, care *The Iron Age*, 239 W. 39th St., New York.

SUPERINTENDENT OR GENERAL FOREMAN—Practical and technical training with 20 years all around manufacturing experience along the line of modern machine shop production, and assemblies including tools, fixtures, and dies. Executive qualifications necessary to supervise men with record of results. Available immediately. Any location in the U. S. A. Address Box G-287, care *The Iron Age*, 239 W. 39th St., New York.

EXECUTIVE, technical, unusual qualifications for position requiring diverse experience and knowledge of detail gained by direct contact, all phases of management, production economics, costs, correspondence and wage incentives in sheet metal, foundry, machine shop and wood-working plants is open for permanent connection. Address Box G-485, care *The Iron Age*, 239 W. 39th St., New York.

MACHINE TOOL MANUFACTURERS DIRECT REPRESENTATIVE—Thoroughly experienced in production and heavy tools, also structural shop equipment. Excellent following in industrials, railroads, etc., in Metropolitan area. Interested in strictly high grade line. Address Box G-523, care *The Iron Age*, 239 W. 39th St., New York.

ASSISTANT CHIEF CHEMIST or Steel Analyst; 30 years of age; married. Ten years' experience in inspection, sampling and analysis of alloy and plain carbon steels, scrap, refractories, pig iron, coke and steel works materials in general. Now employed. Best references. Address Box C-980, care of *The Iron Age*, 1362 Hanna Bldg., Cleveland, Ohio.

SALES EXECUTIVE OR GENERAL SALES MANAGER—39, broad technical, shop and engineering experience. Eight years as director of sales and machine tool salesman for concern of national scope. Central West preferred. Address Box G-499, care *The Iron Age*, 239 W. 39th St., New York.

SALESMAN OF EXPERIENCE and executive ability located in the Metropolitan District, would represent reputable manufacturer of staple products. Address Box G-471, care *The Iron Age*, 239 West 39th St., New York.

EXECUTIVE ACCOUNTANT—Desires connection with manufacturing concern. Familiar with corporate control. Can take full charge of all financial and accounting details including costs and budgetary control. Box C-979, care *The Iron Age*, 1362 Hanna Bldg., Cleveland, O.

STEEL MELTER, not employed at present, experienced in Open Hearth and Electric Furnaces. Good references. Address Box G-472, care *The Iron Age*, 239 W. 39th St., New York.

EXPERIENCED SALES EXECUTIVE would like to represent Eastern firm in Washington and Oregon. Address Box G-473, care *The Iron Age*, 239 West 39th St., New York.

Help Wanted Rates

Set solid, minimum 50 words.....\$3.00
Each additional word 6c
All capitals, minimum 50 words.....\$4.50
Each additional word 9c
All capitals, leaded, minimum 50 words...\$6.00
Each additional word 12c

Situations Wanted Rates

Set solid, minimum 25 words.....\$.75
Each additional word 3c
All capitals, minimum 25 words.....\$1.50
Each additional word 6c
All capitals, leaded, minimum 25 words...\$2.25
Each additional word 9c

Display Advertising Rates

Given on Request

COUNT SEVEN WORDS FOR
KEYED ADDRESS

Do not send original letters of recommendation in replying to advertisements—duplicates will answer the purpose. Letters forwarded without charge.

Employment Exchange

SITUATIONS WANTED

SALES REPRESENTATIVE desires another account partially established with some concern looking for increased business. Now working out of Syracuse, N. Y., covering entire state, excluding New York City. Ten years' sales engineering experience. Address Box G-525, care *The Iron Age*, 239 W. 39th St., New York.

SITUATIONS WANTED

YOUNG MARRIED MAN desires to make connection with a reliable concern, capacity, Sales Representative, making headquarters in Syracuse, N. Y. Nine years sales engineering experience. Commission basis with drawing account desirable. Address Box G-524, care *The Iron Age*, 239 W. 39th St., New York.

SITUATIONS WANTED

MANAGER OR SUPERINTENDENT, wide and varied experience covering supervision and management of all departments in connection with a manufacturing concern. Practical and Technical training with clean record of results. Address Box G-528, care *The Iron Age*, 239 W. 39th St., New York.

Something of interest to you in the Classified Sections

Production executives, engineers, salesmen, used machinery, surplus materials, industrial real estate, contract work facilities, business opportunities, etc.—all these are advertised in the Classified Sections. See pages preceding Products Index.

The Classified Sections of THE IRON AGE

Help Wanted Rates

Set solid, minimum 50 words.....\$3.00
Each additional word 6c
All capitals, minimum 50 words.....\$4.50
Each additional word 9c
All capitals, leaded, minimum 50 words...\$6.00
Each additional word 12c

Situations Wanted Rates

Set solid, minimum 25 words.....\$.75
Each additional word 3c
All capitals, minimum 25 words.....\$1.50
Each additional word 6c
All capitals, leaded, minimum 25 words...\$2.25
Each additional word 9c

Display Advertising Rates Given on Request

COUNT SEVEN WORDS FOR
KEYED ADDRESS

Do not send original letters of recommendation in replying to advertisements—duplicates will answer the purpose. Letters forwarded without charge.

Products Index

ABRASIVE WHEELS—See Grinding Wheels

ABRASIVES

Pangborn Corp., Hagerstown, Md.
Patch-Wegner Co., Rutland, Vt.

ACCUMULATORS—Hydraulic

Elmes, Chas. F., Engrg. Works, Chicago.
Lake Erie Engng. Corp., Buffalo, N. Y.
Southwark Fdry. & Mach. Co., Phila.
Watson-Stillman Co., 71 West St., N.Y.C.
Wood, R. D., & Co., Philadelphia.

ACETYLENE—Dissolved in Cylinders

Air Reduction Sales Co., 60 East 42nd St., N. Y. C.

ACIDS—Pickling

American Chemical Paint Co., Ambler, Pa.

AIR TANKS AND CYLINDERS

Air-Tight Steel Tank Co., Pgh.
Janney, Joseph A., Jr., Phila.
Seafie, William B., & Sons Co., Pgh.

ALLOYS—Calcium-Silicon

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

ALLOYS—Phosphor Bronze

Phosphor Bronze Smelting Co., Phila.

ALLOYS—Silico-Manganese

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

ALLOYS—Titanium

Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

ALLOYS—Tungsten

Vanadium Corp. of America, 120 B'way, New York City.

ALLOYS—Vanadium

Vanadium Corp. of America, 120 B'way, New York City.

ALUMINUM

Rogers Brown & Crocker Bros., Inc., 21 East 40th St., N. Y. C.

AMMONIA RECOVERY PLANTS

Koppers Construction Co., The, Pgh.

ANGLES, BEAMS, CHANNELS AND TEES

Bethlehem (Pa.) Steel Company
Carnegie Steel Co., Pittsburgh
Illinois Steel Warehouse Co., Chicago
Inland Steel Co., Chicago
Jones & Laughlin Steel Corp., Pgh.
Phoenix Iron Co., Phila.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scullin Steel Co., St. Louis, Mo.

ANNEALING—See Heat Treating

ANODES

Meaker Co., The, Chicago.

ANVILS

Atkins, E. C., & Co., Indianapolis, Ind.
West Steel Casting Co., The, Cleveland.

APPRAISERS

Standard Appraisal Co., 6 Church St., N. Y. C.

ARBORS

Morse Twist Drill & Mch. Co., New Bedford, Mass.
Whitman & Barnes, Inc., Detroit, Mich.

ARMORING MACHINES—Wire, Cable, Hose, Etc.

Sleeper & Hartley, Inc., Worcester, Mass.

ARRESTERS—Spark

Harrington & King Perforating Co., Chi.

AXLES—Car or Locomotive

Bethlehem (Pa.) Steel Company.
Carnegie Steel Co., Pittsburgh.

BABBITT METAL

Ryerson, Jos. T., & Son, Inc., Chicago.

BAFFLE WALLS

Johns-Manville Corp., 292 Madison Ave., New York City.

BALING PRESSES—Hydraulic

Galland-Henning Mfg. Co., Milwaukee.

BALING PRESSES—Scrap Metal

Galland-Henning Mfg. Co., Milwaukee.

BALLS—Burnishing

Abbott Ball Co., 1047 New Britain Ave., Hartford, Conn.

BALLS—Forged Chrome Steel for Pe-

verizing
Philadelphia (Pa.) Steel & Iron Co.

BALLS—Steel, Brass or Bronze

Abbott Ball Co., 1047 New Britain Ave., Hartford, Conn.
Auburn Ball Bearing Co., Rochester, N. Y.
New Departure Mfg. Co., Bristol, Ct.

BANDS—Steel

Akron-Selle Co., Akron, Ohio.
Bethlehem (Pa.) Steel Company
Republic Steel Corp., Youngstown, Ohio.

BARRELS—Burnishing

Abbott Ball Co., 1047 New Britain Ave., Hartford, Conn.
Baird Machine Co., Bridgeport, Conn.
Globe Mach. & Stpg. Co., Cleveland
Ransohoff, N. Inc., Cincinnati, Ohio.

BARRELS—Plating

Meaker Co., The, Chicago.

BARRELS—Steel Shop

Cleveland (O.) Wire Spring Co.

BARRELS—Tumbling—See Tumbling Barrels

BARS—Alloy

Bethlehem (Pa.) Steel Co.
Republic Steel Corp., Youngstown, Ohio.

BARS—Cast Bronze

Buckeye Brass & Mfg. Co., Cleveland.

BARS—Concrete, Reinforcing

Laclede Steel Co., St. Louis, Mo.
Nictown Plate Washer Co., Inc., Phila.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scullin Steel Co., St. Louis, Mo.

BARS—Manganese Steel

Manganese Steel Forge Co., Phila.

BARS—Steel

Ames, W. & Co., Jersey City, N. J.
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Co.
Carnegie Steel Co., Pittsburgh.
Illinois Steel Warehouse Co., Chicago.
Inland Steel Co., Chicago.
Philadelphia (Pa.) Steel & Iron Co.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scullin Steel Co., St. Louis, Mo.
Timken Roller Bearing Co., Canton, Ohio.

BASKETS—Pickling

Bresse Bros. Co., Cincinnati.

BATTERY CHARGERS

Cutler-Hammer, Inc., Milwaukee.

BEAMS—See Angles, Beams, Channels and Tees.

BEAKING METAL

Bunting Brass & Bronze Co., Toledo.
Fredericksen Company, Saginaw, Mich.

BEARINGS—Babbitt

Bunting Brass & Bronze Co., Toledo.

BEARINGS—Ball

American Roller Bearing Co., Pittsburgh.
Auburn Ball Bearing Co., Rochester, N. Y.
Bantam Ball Bearing Co., South Bend, Ind.
New Departure Mfg. Co., Bristol, Ct.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Standard Machinery Co., Auburn, R. I.

BEARINGS—Brass and Bronze

American Manganese Bronze Co., Phila.
Buckeye Brass & Mfg. Co., Cleveland.
Bunting Brass & Bronze Co., Toledo, O.
Erie (Pa.) Bronze Co.
Fredericksen Company, Saginaw, Mich.
Lumen Bearing Co., Buffalo, N. Y.

BEARINGS—Oilless

Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.

BEARINGS—Radial

Bantam Ball Bearing Co., South Bend, Ind.

BEARINGS—Roller

American Roller Bearing Co., Pittsburgh.
Bantam Ball Bearing Co., South Bend, Ind.
Rollway Bearing Co., Inc., Syracuse, N. Y.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Standard Machinery Co., Auburn, R. I.
Timken Roller Bearing Co., Canton, Ohio.

BEARINGS—ROLLER TAPERED

Timken Roller Bearing Co., Canton, Ohio.

BEARINGS—Thrust

Bantam Ball Bearing Co., South Bend, Ind.
Rollway Bearing Co., Inc., Syracuse, N. Y.
Standard Machinery Co., Auburn, R. I.
Timken Roller Bearing Co., Canton, O.

BELT DRESSING

Graton & Knight Co., Worcester, Mass.

BELT FASTENERS

Smith, F. P., & Co., Sharon Hills, Pa.

BELT LACING

Graton & Knight Co., Worcester, Mass.

BELTING CEMENT

Graton & Knight Co., Worcester, Mass.

BELTING—Conveyor

New York Belting & Packing Co., 91-93 Chambers St., N. Y. C.

BELTING—Leather

Chicago (Ill.) Rawhide Mfg. Co., 1313 Elston Ave.
Graton & Knight Co., Worcester, Mass.

BELTING—Leather Link

Graton & Knight Co., Worcester, Mass.

BELTING—Rubber

New York Belting & Packing Co., 91-93 Chambers St., N. Y. C.

BENCHES AND TABLES—Steel

Standard Pressed Steel Co., Jenkintown, Pa.

BENCHES—Draw—See Wire Drawing Machinery

BENDING MACHINES—Angle or I-Beams

Buffalo (N. Y.) Forge Co., 492 B'way.
Galland-Henning Mfg. Co., Milwaukee.
Smith, David H., & Sons, Inc., Foot of 51st St., B'klyn, N. Y.
Thomas Spacing Mach. Co., Pgh.

BENDING MACHINES, BAR—Circle or Spiral

Kardong Bros., Inc., Minneapolis, Minn.

BENDING MACHINES—Hand and Power

American Pipe Bending Mch. Co., Boston.
Buffalo (N. Y.) Forge Co., 492 B'way.
Cincinnati (O.) Shaper Co., The.
Cleveland (O.) Punch & Shear Wks. Co.
Dreis & Krump Mfg. Co., Chicago.
Kane & Roach, Syracuse, N. Y.
Pels, Henry, & Co., 90 West St., N. Y. C.
Ryerson, Jos. T., & Son, Inc., Chicago.
Yoder Co., The, Cleveland, O.

BENZOL RECOVERY PLANTS

Koppers Construction Co., The, Pgh.

BILLET GOUGERS & PEELERS

Manning, Maxwell & Moore, Inc., 100 E. 42nd Street, N. Y. C.

BILLETS—Alloy Steel

Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Co.

BILLETS—Carbon Steel

Andrews Steel Co., The, Newport, Ky.

BILLETS—Carbon Vanadium Steel

Andrews Steel Co., The, Newport, Ky.

BILLETS—Chrome Steel

Andrews Steel Co., The, Newport, Ky.

BILLETS—Chrome Nickel Steel

Andrews Steel Co., The, Newport, Ky.

BILLETS—Die Block Steel

Andrews Steel Co., The, Newport, Ky.

BILLETS—Forging

Andrews Steel Co., Newport, Ky.
Bethlehem (Pa.) Steel Co.
Central Iron & Steel Co., Harrisburg, Pa.
Heppenstall Co., Pittsburgh.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.

BILLETS—Nickel Steel

Andrews Steel Co., The, Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

BILLETS—Re-rolling

Andrews Steel Co., Newport, Ky.

BILLETS—Steel

Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem (Pa.) Steel Co.
Central Iron & Steel Co., Harrisburg, Pa.
Inland Steel Co., Chicago.
Republic Steel Corp., Youngstown, Ohio.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.

BLANKS—Brass and Copper

Bridgeport (Conn.) Brass Co.

BLANKS—Gear & Pinion

Bethlehem (Pa.) Steel Co.
Chicago (Ill.) Rawhide Mfg. Co., 1313 Elston Ave.
Edgewater Steel Co., Pittsburgh.

BLAST FURNACE SPECIALTIES

Research Corp., 405 Lexington Ave., N. Y. C.

BLOCKS—Crescoted

Jennison-Wright Co., Toledo.

BLOWERS—Pressure

Anthony Co., Long Island City, N. Y.
Buffalo (N. Y.) Forge Co., 492 B'way.
Champion Blower & Forge Co., Lancaster, Pa.

BLOWERS—Rotary Positive

Connersville (Ind.) Blower Co., Inc., The.
Roots, P. H. & F. M., Co., The, Connersville, Ind.
Wilbraham-Green Blower Co., Pottstown, Pa.

BOILER HEADS—Flanged and Dished

Bethlehem (Pa.) Steel Co.
Ryerson, Jos. T., & Son, Inc., Chicago.

BOILERS—Return Tubular

Muskegon (Mich.) Boiler Wks.

BOILERS—Waste Heat

Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.
Frey Engineering Co., Chicago.

BOILERS—Water Tube

Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

BOLT CUTTERS

Acme Mchry. Co., Cleveland, O.
National Mchry. Co., Tiffin, Ohio.

BOLT AND NUT MACHINERY

Acme Machinery Co., Cleve.
Economy Engng. Co., The, Willoughby, O.
Manville, E. J., Mach. Co., Waterbury, Ct.
National Mchry. Co., Tiffin, Ohio.
Waterbury (Ct.) Farrel Fdry. & Mch. Co.

BOLT & RIVET CLIPPERS

Helwig Mfg. Co., St. Paul, Minn.

BOLTS—Carriage & Machine.

Buffalo Bolt Co., N. Tonawanda, N. Y.
Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Special

Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Track

Inland Steel Co., Chicago.

BOLTS AND NUTS

Ames, W., & Co., Jersey City, N. J.
Bell, David, Co., Inc., The, Buffalo, N. Y.
Bethlehem (Pa.) Steel Co.
Buffalo Bolt Co., N. Tonawanda, N. Y.
Clark Bros. Bolt Co., Milldale, Conn.
National Acme Co., The, Cleveland.
Neely Nut & Bolt Co., Pgh.
Oliver Iron & Steel Corp., Pittsburgh, Pa.
Reed & Prince Mfg. Co., Worcester, Mass.
Rhode Island Tool Co., Providence, R. I.
Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago.

BORING, DRILLING AND MILLING MACHINES—Horizontal

Barnes, W. F., & John Co., Rockford, Ill.
Defiance (O.) Mch. Wks.
Hill, Clarke & Co. of Chicago, 647 W. Washington Blvd., Chicago, Ill.
Lucas Machine Tool Co., Cleve.
Ryerson, Jos. T., & Son, Inc., Chicago.
Sellers, William, & Co., Inc., Phila.
Universal Boring Mch. Co., Hudson, Mass.

BORING & DRILLING MACHINES—Vertical

Baker Bros., Inc., Toledo.
Bullard Co., The, Bridgeport, Ct.
Consolidated Mch. Tool Corp. of America, Rochester, N. Y.

BORING BARS

Bullard Co., The, Bridgeport, Ct.

BORING AND TURNING MILLS—Vertical

Bullard Co., The, Bridgeport, Ct.
Sellers, William, & Co., Inc., Phila.

BOXES—Annealing

Blaw-Knox Co., Pittsburgh.
Petroleum Iron Wks. Co., Sharon, Pa.
Union Steel Casting Co., Pittsburgh.

BOXES—Steel

Cleveland (O.) Wire Spring Co.

BRAKES—Electric

Clark Controller Co., The, Cleveland, O.
Cutler-Hammer, Inc., Milwaukee.

BRAKES—Metal Forming

Cincinnati (O.) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago.
Minster (O.) Machine Co.
Obl. Geo. A., & Co., Inc., Newark, N. J.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

(ALL THESE COMPANIES CARRY AN AD IN THIS ISSUE)
ALPHABETICAL INDEX PAGES 214-216

BREECHINGS

Muskegon (Mich.) Boiler Works

BRICK—ChromeGeneral Refractories Co., Philadelphia, Pa.
Harrison-Walker Refractories Co., Pgh.
Lavino, E. J., & Co., Phila.
Stowe-Fuller Refractories Co., The, Cleve.**BRICK—Fire Clay**Bellevue Industrial Furnace Co., Detroit.
Carbondum Co., The, Niagara Falls, N. Y.
General Refractories Co., Philadelphia, Pa.
Harrison-Walker Refractories Co., Pgh.
Stowe-Fuller Refractories Co., The, Cleve.**BRICK—Magnesite**General Refractories Co., Philadelphia, Pa.
Harrison-Walker Refractories Co., Pgh.
Lavino, E. J., & Co., Phila.**BRICK—Silica**General Refractories Co., Philadelphia, Pa.
Harrison-Walker Refractories Co., Pgh.
Lavino, E. J., & Co., Phila.
U. S. Refractories Corp., Mt. Union, Pa.**BRIDGE BUILDERS**Lakeside Bridge & Steel Co., 103 Villard Ave., Milwaukee, Wis.
McClintic-Marshall Co., Pgh.
Phoenix Iron Co., Phila.
Shoenaker Bridge Co., Pottstown, Pa.**BRIDGE OPERATING MACHINERY—Movable**

Earle Gear & Mch. Co., Phila.

BROACHESAmer. Broach & Mch. Co., Ann Arbor, Mich.
Lapointe Mch. Tool Co., Hudson, Mass.**BROACHING MACHINES**Amer. Broach & Mch. Co., Ann Arbor, Mich.
Lapointe Mch. Tool Co., Hudson, Mass.**BRONZE—Phosphor**

Phosphor Bronze Smelting Co., Phila.

BRONZE BAR—Cored and Solid

Fredericksen Company, Saginaw, Mich.

BUCKETS—ClamshellBlaw-Knox Co., Pittsburgh.
Browning Crane Co., The, Cleveland.
Hayward Co., 50 Church St., N. Y. C.
Industrial Brownhoist Corp., Cleveland.
Orton Crane & Shovel Co., Chicago.
Owen Bucket Co., Cleveland.**BUCKETS—Dragline**

Harnischfeger Corp., Milwaukee.

BUCKETS—Electric Motor

Hayward Co., 50 Church St., N. Y. C.

BUCKETS—Elevator

Hendrick Mfg. Co., Carbondale, Pa.

BUCKETS—Orange Peel

Hayward Co., 50 Church St., N. Y. C.

BUCKETS—Single Line

Milwaukee (Wis.) Electric Crane & Hoist Corp.

BUCKLES—Bale, Tie

Joliet (Ill.) Wrought Washer Co.

BUFFING COMPOSITIONS—Stainless Steel

McAleer Mfg. Co., The, Detroit, Mich.

BUFFS

Divine Brothers Co., Utica, N. Y.

BUILDINGS—FactoryAustin Co., The, Cleveland.
Blaw-Knox Co., Pittsburgh.**BUILDINGS—Steel**Austin Co., The, Cleveland.
Belmont Iron Works, Phila.
Blaw-Knox Co., Pittsburgh.
McClintic-Marshall Co., Pgh.**BULLDOZERS**

Beatty Mch. & Mfg. Co., Hammond, Ind.

BUNDLERS—Scrap (Wire)

Vaughn Mehry, Co., Cuyahoga Falls, O.

BUNKERS—Coal

Muskegon (Mich.) Boiler Works

BURNERS—Oil or GasAnthony Co., The, L. I. City, N. Y.
Best, W. N., Corp., 295 5th Ave., N. Y. C.
Economy Furnace Co., Chicopee, Mass.
Fryen Engineering Co., Chicago.
Hauk Mfg. Co., 128 Tenth St., Bklyn, N. Y.
Surface Combustion Co., 2375 Dorr St., Toledo.**BURRS—Steel**Master Products Co., The, 6120 Park Ave. S. E., Cleveland.
Wrought Washer Mfg. Co., Milwaukee.**BUSHINGS—Brass and Bronze**Buckeye Brass & Mfg. Co., Cleveland.
Bunting Brass & Bronze Co., Toledo.
Erie (Pa.) Bronze Co.
Fredericksen Company, Saginaw, Mich.
Harsch, John, Bronze & Fdry. Co., The, Cleveland, Ohio.
Shenango-Penn Mold Co., Pittsburgh.**BUSHINGS—Oilless**

Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.

BUSHINGS—Phosphor BronzeAmerican Manganese Bronze Co., Phila.
Phosphor Bronze Smelting Co., Phila.**BY-PRODUCTS COKE & GAS OVENS**

Koppers Construction Co., The, Pgh.

CABLEWAYS AND TRAMWAYS—See Tramways**CAR SPOTTER (Electric)**

Caldwell, H. W. & Son Co., Chicago, Ill.

CARBIDE

Air Reduction Sales Co., 60 East 42nd St., N. Y. C.

CARBURIZING—See Heat Treating**CARS—Dump**

Atlas Car & Mfg. Co., Cleveland

CARS—Industrial and MiningAtlas Car & Mfg. Co., Cleve.
Chase Fdry. & Mfg. Co., Columbus, O.**CASE HARDENING—See Heat Treating****CASTERS—Industrial Truck**

Colson Co., The, Elyria, Ohio.

CASTINGS—Acid or Heat ResistingAmerican Manganese Bronze Co., Phila.
American Manganese Steel Co., Chicago Heights, Ill.Harsch, John, Bronze & Fdry. Co., The, Cleveland, Ohio.
Hodkins Mfg. Co., Detroit.National Alloy Steel Co., Blawnox, Pa.
West Steel Casting Co., The, Cleveland.**CASTINGS—Aluminum**

Harsch, John, Bronze & Fdry. Co., The, Cleveland, Ohio.

CASTINGS—Brass, Bronze, Copper or AluminumAmerican Manganese Bronze Co., Phila.
Atlas Brass Fdry. Co., Columbus, Ohio.
Bethlehem (Pa.) Steel Co.
Buffalo (N. Y.) Bronze Die Cast Corp.
Caldman, A. W., Mfg. Co., Pgh.
Erie (Pa.) Bronze Co.
Harsch, John, Bronze & Fdry. Co., The, Cleveland, Ohio.Lumen Bearing Co., Buffalo, N. Y.
Newton Die Casting Corp., New Haven, Conn.

Parkersburg (W. Va.) Rig & Reel Co., Inc.

Phosphor Bronze Smelting Co., Phila.

Spencer's, I. S., Sons, Inc., Guilford, Ct.

Turner & Seymour Mfg. Co., Torrington, Ct.

York (Pa.) Fdry. & Mch. Co.

CASTINGS—Die

Newton Die Casting Corp., New Haven, Ct.

CASTINGS—Electric SteelAmerican Steel Foundries, Chicago.
Calumet Electric Casteel Co., Hammond, Ind.

Commercial Steel Casting Co., Marion, O.

Crucible Steel Casting Co., Cleveland.

Industrial Steel Casting Co., The, Toledo.

Maynard Elec. Steel Casting Co., Milw.

Smith, Geo. H., Steel Casting Co., Milw.

Treadwell Engineering Co., Easton, Pa.

West Steel Casting Co., The, Cleveland.

CASTINGS—Gray Iron

Andes, Inc., Lancaster, Pa.

Bethlehem (Pa.) Steel Co.

Comet Die Fdry. Co., The, Rocky Hill, Ct.

Electric Boat Co., Groton, Conn.

Excelsior Tool & Mch. Co., E. St. Louis, Ill.

Eyster, Weiser Co., York, Pa.

Forest City-Walworth Run Fdries. Co., Cleve.

Hill Clutch Machine & Foundry Co., 6103 Broadway Ave., N. W., Cleveland, O.

Hyde Park (Pa.) Fdry. & Mch. Co.

Kline Hardware Co., Albion, Pa.

Moloch Fdry. & Mch. Co., Kaukauna, Wis.

National Roll & Fdry. Co., Avonmore, Pa.

Newark (N. J.) Malleable Iron Wks., North Wales (Pa.) Mch. Co., Inc.

Parkersburg (W. Va.) Rig & Reel Co., Inc.

Penn Foundry & Mfg. Co., Box 182, Reading, Pa.

Poele Engine & Mch. Co., Balto., Md.

Roversford (Pa.) Fdry. & Mch. Co., Inc.

Sessions Foundry Co., The, Bristol, Ct.

Spencer's, I. S., Sons, Inc., Guilford, Ct.

Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

Toledo (O.) Mch. & Tool Co.

York (Pa.) Fdry. & Mch. Co.

CASTINGS—High Test and Alloy Iron

Parkersburg (W. Va.) Rig & Reel Co., Inc.

CASTINGS—Malleable

Malleable Iron Fittings Co., Branford, Conn.

Meeker Foundry Co., Newark, N. J.

Newark (N. J.) Malleable Iron Wks., Newark (N. J.)

Northern Mch. Iron Co., St. Paul, Minn.

Peoria (Ill.) Malleable Castings Co.

Philadelphia (Pa.) Hardware & Malleable Iron Wks., Inc.

Richmond (Ind.) Malleable Castings Co.

Timken Roller Bearing Co., Canton, Ohio.

Vermilion Mch. Iron Co., Hoopeston, Ill.

CASTINGS—Manganese Steel

American Manganese Steel Co., Chicago Heights, Ill.

Frog Switch & Mfg. Co., The, Carlisle, Pa.

CASTINGS—Semi-Steel

Electric Boat Co., Groton, Conn.

Malleable Iron Fittings Co., Branford, Ct.

CASTINGS—Steel

American Steel Foundries, Chicago.

Atlas Steel Casting Co., Buffalo, N. Y.

Bethlehem (Pa.) Steel Company

Ridgboro (Pa.) Steel Fdry. & Mch. Co.

Calumet Electric Casteel Co., Hammond, Ind.

Cann & Saul Steel Co., Phila.

Cincinnati (O.) Steel Castings Co.

Commercial Steel Casting Co., Marion, O.

Crucible Steel Casting Co., Cleveland.

Crucible Steel Castings Co., Lansdowne, Pa.

Duquesne Steel Fdry. Co., Pittsburgh, Pa.

Erie (Pa.) Forge Co.

Falk Corp., Milwaukee.

Industrial Steel Casting Co., The, Toledo.

Malleable Iron Fittings Co., Branford, Ct.

Maynard Elec. Steel Castings Co., Milw.

Seullin Steel Co., St. Louis, Mo.

Smith, Geo. H., Steel Casting Co., Milw.

Strong Steel Foundry Co., Buffalo, N. Y.

Union Steel Casting Co., Pittsburgh.

Union Switch & Signal Co., Swissvale, Pa.

West Steel Casting Co., The, Cleveland.

CEMENT—Leather Belting

Graton & Knight Co., Worcester, Mass.

CEMENT—Refractory

Carborundum Co., The, Perth Amboy, N. J.

Harrison-Walker Refractories Co., Pgh.

Johns-Manville Corp., 292 Madison Ave., New York City.

CEMENT—Silica and Chrome

General Refractories Co., Philadelphia, Pa.

Harrison-Walker Refractories Co., Pgh.

CEMENT ROOFING TILE

American Cement Tile Mfg. Co., 803 Oliver Bldg., Pgh.

CENTERING MACHINES

Whitton, D. E. Mch. Co., New London, Ct.

CENTERS—Index

Simmons Mch. Tool Corp., Albany, N. Y.

CHAINS—Conveyor and Elevator

Jones & Laughlin Steel Corp., Pgh.

CHAINS—Power Transmission

Boston Gear Works Sales Co., Norfolk Downs, Mass.

Whitney Mfg. Co., Hartford, Conn.

CHANNELS—See Angles, Beams, Channels and Tees**CHAPLETS**

Erdie Perforating Co., Rochester, N. Y.

CHARGING MACHINES—Cupola

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CHARGING MACHINES—Manipulators

Alliance (Ohio) Mch. Co.

CHECKS—Metal

Noble & Westbrook Mfg. Co., Hartford, Conn.

CHEMICALS—Industrial

Vanadium Corp. of America, 120 B'way, New York City.

CHROMIUM METAL

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

CHUCKING MACHINES—Automatic

Baird Mch. Co., Bridgeport, Ct.

CHUCKING MACHINES—Multiple Spindle

Baird Mch. Co., Bridgeport, Ct.

National Acme Co., Cleveland.

CHUCKS—Air Operated

Logansport (Ind.) Mch. Co.

CHUCKS—Drill

Cleveland (O.) Twist Drill Co.

Morse Twist Drill & Mch. Co., New Bedford, Mass.

CHUCKS—Lathe

Hogson & Pettis Mfg. Co., New Haven, Ct.

Whitton, D. E. Mch. Co., New London, Ct.

CIRCLES—Phosphor Bronze

Phosphor Bronze Smelting Co., Phila.

CLAMPS—Drop Forged

Williams, J. H., & Co., Buffalo, N. Y.

CLEANERS—Metal

American Chemical Paint Co., Ambler, Pa.

Ford, J. B., Co., Wyandotte, Mich.

Meeker Co., The, Chicago.

Oakite Prod., Inc., 22 Thames St., N. Y. C.

CLUTCHES—Friction

Caldwell, W. E., Co., 260 Brandeis Street, Louisville, Ky.

Johns-Manville Corp., 292 Madison Ave., New York City.

Jones, W. A., Fdry. & Mch. Co., 4431 W. Roosevelt Road, Chicago.

Twin Disc Clutch Co., Racine, Wis.

CLUTCHES—Magnetic

Cutler-Hammer, Inc., Milwaukee.

Dings Magnetic Separator Co., Milwaukee.

Magnetic Mfg. Co., 626 So. 28th St., Milwaukee.

COAL

Cleveland (O.) Cliffs Iron Co.

Hanna Furnace Corp., The, Detroit, Mich.

Pickands, Mather & Co., Cleveland, Ohio.

Rogers Brown & Crocker Bros., Inc., 21 E. 40th St., N. Y. C.

COAL ORE AND ASH HANDLING MACHINERY

Alliance (O.) Machine Co.

Bartlett, C. O. & Snow Co., Cleveland.

Hayward Co., The, 50 Church St., N. Y. C.

Industrial Brownhoist Corp., Cleveland.

COILING MACHINES—Metallic, Hose, Speedometer, Casing, Resistance Coils, Wire Spirals, Etc.

Sleeper & Hartley, Inc., Worcester, Mass.

COKE—Metallurgical

Cleveland (O.) Cliffs Iron Co.

Hillman Coal & Coke Co., Pgh.

Pickands Mather & Co., Cleveland.

Rogers Brown & Crocker Bros., Inc., 21 E. 40th St., N. Y. C.

Walter-Wallingford & Co., Cincinnati, O.

COKE OVEN MACHINERY

Alliance (O.) Machine Co.

Atlas Car & Mfg. Co., Cleve.

Koppers Construction Co., The, Pgh.

COKE OVENS—By-Products

Koppers Construction Co., The, Pgh.

COKE OVENS—Cross Regenerators

Koppers Construction Co., The, Pgh.

COKE OVENS—With Recovery of By-Products

Koppers Construction Co., The, Pgh.

COLLETS

Rivett Lathe & Grinder Corp., Boston

COMPRESSORS—Air

Bury Compressor Co., Erie, Pa.

De Laval Steam Turbine Co., Trenton, N. J.

Penna Pump & Compressor Co., Easton, Pa.

Sullivan Machinery Co., Chicago.

Westinghouse Traction Brake Co., Wilmerding, Pa.

COMPRESSORS—Gas

Bury Compressor Co., Erie, Pa.

Penna Pump & Compressor Co., Easton, Pa.

CONCRETE CONSTRUCTION

Austin Co., The, Cleveland.

CONCRETE ROOFING TILE

American Cement Tile Mfg. Co

CONTROLLERS—Temperature

Bristol Co., Waterbury, Ct.
Wilson-Maclean Co., Inc., 738 E. 143rd St., N. Y. C.

CONTROLLERS—Valve, Electrically Operated

Cutler-Hammer, Inc., Milwaukee.

CONVEYING AND ELEVATING MACHINERY

Bartlett, C. O. & Snow Co., Cleveland.
Industrial Brownhoist Corp., Cleveland.
Portable Machinery Co., Clifton, N. J.

CONVEYORS—Portable

Portable Machinery Co., Clifton, N. J.

COPING MACHINES

Cleveland (O.) Punch & Shear Wks. Co.
Fels, Henry, & Co., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

CORUNDUM WHEELS—See Grinding Wheels**COTTERS AND KEYS—Spring**

Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., Pontiac, Mich.
Smith, F. P., & Co., Sharon Hills, Pa.
Western Wire Products Co., St. Louis.

COUNTERBORES

Cleveland (O.) Twist Drill Co.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Whitman & Barnes, Inc., Detroit, Mich.

COUNTERS—Production

Veeder-Root, Inc., Hartford, Ct.

COUNTERSHAFT—Cone, Variable Speed

Evans Friction Cone Co., Newton Highlands, Mass.

COUNTING MACHINES

Veeder-Root, Inc., Hartford, Ct.

COUPLINGS—Air Hose

Cleveland (O.) Pneumatic Tool Co., The.

COUPLINGS—Flexible

Boston Gear Works Sales Co., Norfolk Downs, Mass.
Clark Controller Co., The, Cleveland, O.
Poole Bros. Gear & Mch. Co., Dept. 33, 111 N. Canal St., Chicago.
Poole Engng. & Mch. Co., Balto., Md.

COUPLINGS—Friction Clutch

Caldwell, W. E., Co., 260 Brandeis St., Louisville, Ky.
Jones, W. A., Fdry. & Mch. Co., 4434 W. Roosevelt Road, Chicago.

COUPLINGS—Shaft

Falk Corp., Milwaukee.
Jones, W. A., Fdry. & Mch. Co., 4434 W. Roosevelt Road, Chicago.
Tomkins-Johnson Co., Jackson, Mich.

COUPLINGS—Universal Mill

Hogland's, M., Sons Co., Rockaway, N. J.

CRANES—Crawling Tractor

Browning Crane Co., The, Cleveland.
Conco Crane & Eng. Wks. Div. of H. D. Conkey & Co., 36 So. Jefferson St., Mendota, Ill.
Harnischfeger Corp., Milwaukee.
Orton Crane & Shovel Co., Chicago.

CRANES—Creeper

Industrial Brownhoist Corp., Cleveland.

CRANES—Electric, Industrial Truck Mounted

Baker-Rauland Co., Cleveland, O.
Crescent Truck Co., Lebanon, Pa.

CRANES—Electric Traveling

Alliance (O.) Machine Co.
American Crane Co., Inc., The, Friendship, N. Y.
Bedford (Ind.) Foundry & Machine Co.
Box Crane & Hoist Corp., Phila.
Browning, Victor R., & Co., Inc., Cleveland, Ohio.
Cleveland Crane & Engng. Co., Wickliffe, O.
Conco Crane & Eng. Wks. Div. of H. D. Conkey & Co., 36 So. Jefferson St., Mendota, Ill.
Euclid (O.) Crane & Hoist Co.
Harnischfeger Corp., Milwaukee.
Manning, Maxwell & Moore, Inc., 100 E. 42nd St., New York City.
Maris Brothers, Inc., Phila.
Milwaukee (Wis.) Electric Crane & Hoist Corp.
Morgan Engineering Co., Alliance, O.
Northern Engineering Wks., 212 Chene St., Detroit.
Payne, N. B., & Co., 25 Church St., N.Y.C.
Reading (Pa.) Chain & Block Corp.
Robbins & Myers, Inc., Springfield, Ohio.
Rooper Crane & Hoist Wks., Inc., Reading, Pa.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CRANES—Gantry

American Crane Co., Inc., Friendship, N. Y.
Cleveland Crane & Engng. Co., Wickliffe, O.

Lakeside Bridge & Steel Co., 103 Villard Ave., Milwaukee, Wis.
Manning, Maxwell & Moore, Inc., 100 E. 42nd Street, N. Y. C.
Morgan Engineering Co., Alliance, O.
Northern Engineering Wks., 212 Chene St., Detroit.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CRANES—Hand Power

Armington Engineering Co., Euclid, O.
Bedford (Ind.) Foundry & Machine Co.
Box Crane & Hoist Corp., Phila.
Cleveland Crane & Engng. Co., Wickliffe, O.
Maris Brothers, Inc., Phila.
Milwaukee (Wis.) Electric Crane & Hoist Corp.
Northern Engineering Wks., 212 Chene St., Detroit.
Payne, N. B., & Co., 25 Church St., N.Y.C.
Reading (Pa.) Chain & Block Corp.
Robbins & Myers, Inc., Springfield, Ohio.

CRANES—Jib

Box Crane & Hoist Corp., Phila.
Northern Engineering Wks., 212 Chene St., Detroit.
Reading (Pa.) Chain & Block Corp.
Robbins & Myers, Inc., Springfield, Ohio.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CRANES—Locomotive

Browning Crane Co., The, Cleveland.
Harnischfeger Corp., Milwaukee.
Hyman-Michaels Co., Chicago, Ill.
Industrial Brownhoist Corp., Cleveland.
Ohio Locomotive Crane Co., Bucyrus, O.
Orton Crane & Shovel Co., Chicago.

CRANES—Monorail

American Monorail Co., The, Cleveland.
Cleveland Electric Tramrail, Wickliffe, O.
Northern Engineering Wks., 212 Chene St., Detroit.
Reading (Pa.) Chain & Block Corp.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CRANES—Motor Truck

Browning Crane Co., The, Cleveland.

CRANES—Portable

Canton (O.) Fdry. & Machine Co.

CRANES—Portable, Electric

Automatic Transportation Co., Inc., 101 West 87th St., Chicago, Ill.

CRANES—Transfer

Reading (Pa.) Chain & Block Corp.

CRANES—Wall

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CRANK SHAFTS

Bay City Forge Co., Erie, Pa.
Union Switch & Signal Co., Swissvale, Pa.

CRIMPING MACHINES

Quickwork Co., The (Not Incorporated)—H. Collier Smith, Owner) St. Marys, O.
Streine Tool & Mfg. Co., New Bremen, O.

CRUCIBLES—Metallurgical

McCullough-Dalziel Crucible Co., Pgh.
Ross-Tacony Crucible Co., Phila.

CRUSHERS—Coal

American Pulverizer Co., St. Louis, Mo.
Bartlett, C. O. & Snow Co., Cleveland.

CRUSHERS—Steel Turning

American Crusher & Machinery Corp.
853 B'way, N. Y. C.
American Pulverizer Co., St. Louis, Mo.

CRUSHERS—Stone

Morgan Engineering Co., Alliance, O.
Traylor Engng. & Mfg. Co., Allentown, Pa.

CULVERTS

Newport (Ky.) Rolling Mill Co.

CUPOLAS—Foundry

Northern Engineering Wks., 212 Chene St., Detroit.

CUTTERS—Milling

Barber-Colman Co., Rockford, Ill.
Brown & Sharpe Mfg. Co., Pro., R. I.
Cleveland (O.) Twist Drill Co.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Tomkins-Johnson Co., Jackson, Mich.
Union Twist Drill Co., Athol, Mass.

CUTTING COMPOUNDS

Oakite Prod., Inc., 22 Thames St., N.Y.C.

CUTTING OFF MACHINES—Cold Saw

Espan-Lucas Mch. Wks., Philadelphia.
Hurlbut Rogers Mchry. Co., The, Nashua, N. H.

CUTTING-OFF MACHINES—Pipe or Tubing

Bardons & Oliver, Cleve.
Bignall & Keeler Mch. Work, Edwardsville, Ill.
Etna Machine Co., The, Toledo, O.
Hurlbut Rogers Mchry. Co., The, Nashua, N. H.

CUTTING AND WELDING APPARATUS—Oxy-Acetylene—See Welding and Cutting Machines and Equipment—Oxy-Acetylene

CYLINDERS—Compressed Air, Gas, etc.
National Tube Co., Pittsburgh.
Smith, A. O., Corp., Milwaukee.

CYLINDERS—Seamless

National Tube Co., Pittsburgh.

DERRICKS

American-Terry-Derrick Co., South Kearney, N. J.
Hayward Co., The, 50 Church St., N. Y. C.
Lakeside Bridge & Steel Co., 103 Villard Ave., Milwaukee, Wis.
Mallory Machinery Corp., Baltimore.

DIAMOND TOOLS

Dickinson, Thos. L., 34 Cold St., N. Y. C.

DIE BLOCKS

Bethlehem (Pa.) Steel Co.
Heppenthal Co., Pittsburgh.
Wettersell Bros. Co., Cambridge, 39, Mass.

DIE CUSHIONS—Pneumatic

Marquette Tool & Mfg. Co., Chicago, Ill.

DIE SINKING MACHINES—Automatic

Keller Mechanical Engng. Corp., 78 Washington St., Brooklyn, N. Y.

DIES—Embossing and Stamping

Hogman & Pettis Mfg. Co., New Haven, Ct.
Keller Mechanical Engng. Corp., 78 Washington St., Brooklyn, N. Y.
Schwerdtle Stamp Co., Bridgeport, Ct.

DIES—Gripping and Heading

Marchant, Geo. F., Co., Chicago.

DIES—Pipe Threading

Bignall & Keeler Mch. Wks., Edwardsville, Ill.
Curtis & Curtis Co., Bridgeport, Ct.
Murechey Mch. & Tool Co., 951 Porter St., Detroit.

DIES—Screw and Thread Cutting

Curtis & Curtis Co., Bridgeport, Ct.
Eastern Mach. Screw Corp., New Haven, Conn.
Jones & Lamson Mch. Co., Springfield, Vt.
Murechey Mch. & Tool Co., 951 Porter St., Detroit.
National Acme Co., The, Cleveland.

DIES—Self-Opening Adjustable

Consolidated Mch. Tool Corp. of America, Rochester, N. Y.
Eastern Mach. Screw Corp., New Haven, Ct.
Geometric Tool Co., New Haven, Conn.
Jones & Lamson Mch. Co., Springfield, Vt.
Murechey Mch. & Tool Co., 951 Porter St., Detroit.
National Acme Co., The, Cleveland.

DIES—Sheet Metal Working

Adrian Machine Wks., Inc., 82 Richards St., Bklyn., N. Y.
Beatty Mch. & Mfg. Co., Hammond, Ind.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.

DIES—Budd-Ranney Eng. Co., The, Columbus, O.

Cleveland (O.) Punch & Shear Wks. Co.
Ferracute Machine Co., Bridgeton, N. J.
New England Pressed Steel Co., 1 Washington Ave., Natick, Mass.
Niagara Mch. & Tool Wks., Buffalo, N. Y.
Richards, I. P., Co., Providence, R. I.
Toledo (O.) Mach. & Tool Co.
Worcester (Mass.) Stamped Metal Co.
Zeh & Halmemann Co., Newark, N. J.

DIES—Steel Letters and Stamps

Noble & Westbrook Mfg. Co., Hartford, Ct.

DISCS—Abrasive

Gardner Machine Co., Beloit, Wis.

DOLOMITE

Baker, J. E., Co., York, Pa.

DOORS AND SHUTTERS—Fireproof

Kinnear Mfg. Co., 817-67 Field Ave., Columbus, Ohio.

DOORS AND SHUTTERS—Steel or Wood Rolling

Kinnear Mfg. Co., 817-67 Field Ave., Columbus, Ohio.

DRAWBENCHES

Aetna-Standard Eng. Co., Youngstown, O.

DRAWN WORK—Metal—See Stampings or Drawings—Metal**DRILL HEADS—Multiple**

Baker Bros., Inc., Toledo, O.

DRILLING MACHINES—Automatic

Barnes Drill Co., Inc., Rockford, Ill.

DRILLING MACHINES—Bench

Avey Drilling Mch. Co., Cincinnati, O.
Kingsbury Mch. Tool Corp., Keene, N. H.
Leland-Gifford Co., Worcester, Mass.

DRILLING MACHINES—Heavy Duty

Baker Bros., Inc., Toledo, O.
Barnes Drill Co., Inc., Rockford, Ill.

DRILLING MACHINES—Horizontal

Baker Bros., Inc., Toledo, O.
Barnes, W. F. & John Co., Rockford, Ill.
Kingsbury Mch. Tool Corp., Keene, N. H.
Langelier Manufacturing Co., Providence, R. I.

DRILLING MACHINES—Multiple Spindle

Baker Bros., Inc., Toledo, O.
Barnes Drill Co., Inc., Rockford, Ill.
Buffalo (N. Y.) Forge Co., 492 B'way.
Defiance (O.) Machine Works.
Langelier Manufacturing Co., Providence, R. I.
Thomas Spacing Mch. Co., Pgh., Pa.

DRILLING MACHINES—Multiple Spindle, Vertical

Avey Drilling Mch. Co., Cincinnati, O.

DRILLING MACHINES—Portable Electric

Black & Decker Mfg. Co., The, Towson, Md.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Independent Pneumatic Tool Co., Chicago.
Standard Electrical Tool Co., The, Cincinnati.

DRILLING MACHINES—Portable Pneumatic

Cleveland (O.) Pneumatic Tool Co., The.
Hewig Mfg. Co., St. Paul, Minn.
Independent Pneumatic Tool Co., Chicago.
Warner & Swasey Co., The, Cleveland.

DRILLING MACHINES—Radial

American Tool Works Co., Cincinnati.
Cincinnati (O.) Bickford Tool Co.
Cleveland (O.) Punch & Shear Wks. Co.
Harrington Co., The, Philadelphia.
Hyerson, Jos. T., & Son, Inc., Chicago.
Thomas Spacing Mch. Co., Pgh., Pa.

DRILLING MACHINES—Sensitive

Avey Drilling Mch. Co., Cincinnati, O.
Buffalo (N. Y.) Forge Co., 492 B'way.
Langelier Manufacturing Co., Providence, R. I.
Leland-Gifford Co., Worcester, Mass.
Taylor & Fenn Co., Hartford, Ct.

DRILLING MACHINES—Vertical

Baker Bros., Inc., Toledo, O.
Barnes Drill Co., Inc., Rockford, Ill.
Barnes, W. F. & John Co., Rockford, Ill.
Buffalo (N. Y.) Forge Co., 492 B'way.
Champion Blower & Forge Co., Lancaster, Pa.
Cincinnati (O.) Bickford Tool Co.
Defiance (O.) Machine Works.
Harrington Co., The, Philadelphia.
Hyerson, Jos. T., & Son, Inc., Chicago.

DRIVES—Multi V-Belt

Allis-Chalmers Mfg. Co., Milwaukee.

DROP FORGINGS—See Forgings—Drop, Iron or Steel**DROP HAMMERS—See Hammers—Drop****DROP PRESSES—See Presses—Drop****DRYERS FOR ALL MATERIAL**

Bartlett, C. O. & Snow Co., Cleveland.
Buffalo (N. Y.) Forge Co., 492 B'way.
Drying Systems, Inc., Chicago, Ill.
Duff Patents Co., Inc., Pgh.

DUST COLLECTORS

Buffalo (N. Y.) Forge Co., 492 B'way.
Pangborn Corporation, Hagerstown, Md.
Research Corp., 405 Lexington Ave., N. Y. C.
Sig. W. W., Mfg. Co., Cleveland, O.

EAVE TROUGH—See Gutters**ECONOMIZERS**

Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

ELECTRIC LIGHTING

General Electric Vapor Lamp Co., Hoboken, N. J.

ELECTRIC WELDING—See Welding—Electric**ELECTRIC WIRING FITTINGS**

Jefferson Electric Co., Chicago.

ELECTRICAL EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee.

ELEVATORS—Portable

Lewis-Shepard Co., 122 Walnut St., Water town Station, Boston.

ELEVATORS—Steam Hydraulic

Ridgway, Craig & Son Co., Coatesville, Pa.

EMERY WHEELS—See Grinding Wheels**ENAMELING**

Geuder, Panshke & Frey Co. (Contract Mfg. Div.), Milwaukee.

ENAMELING MCHS.—Magnetic Wire

Sleeper & Hartley, Inc., Worcester, Mass.

ENGINEERS—Consulting

Brassett, H. A., & Co., Chicago.
Frey Engineering Co., Chicago.
Koppers Construction Co., The, Pgh.
McKee, Arthur G., & Co., Cleve.
Perin & Marshall, 11 West 42nd St., N. Y. C.

ENGINEERS—Foundry

Austin Co., The, Cleveland.

ENGINEERS—Industrial

Llewellyn, Thomas J., & Co., Pgh.

ENGINEERS AND CONTRACTORS

Austin Co., The, Cleveland.
 Freyn Engineering Co., Chicago.
 Kennedy, Julian, Pgh.
 Koppers Construction Co., The, Pgh.
 Laughlin, Alex., & Co., Pgh.
 McKee, Arthur G., & Co., Cleve.
 Pennsylvania Engng. Wks., New Castle, Pa.
 Stevens, Arthur L., Corp., Chicago.
 Swindell-Dressler Corp., Box 1753, Pgh.

ENGINES—Second Hand

Archer & Baldwin, Inc., 126 Liberty St., New York City.

ENGINES—Steam

Dake Engine Co., Grand Haven, Mich.

EYELET MACHINES

Manville, E. J., Mch. Co., Waterbury, Ct.

EYELETS

Platt Bros. & Co., The, Waterbury, Ct.

FACING MACHINES—Structural

Thomas Spacing Mch. Co., Pgh., Pa.

FACTORY CONSTRUCTION

Austin Co., The, Cleveland.

FANS—Man Cooling

Buffalo (N. Y.) Forge Co., 492 B'way.

FELTS—Wool Mechanical

Booth Felt Co., Inc., The, 477-478 19th St., Bklyn., N. Y.
 Continental Felt Co., 890 B'way, N. Y. C.
 Felters Co., The, Boston, Mass.

FENCES—Woven Wire

Page Steel & Wire Co., Bridgeport, Ct.

FENCING—WireBethlehem (Pa.) Steel Co.
Jones & Laughlin Steel Corp., Pittsburgh.**FERRO ALLOYS—Chromium**

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
 Lavino, E. J., & Co., Phila.
 Pittsburgh Metallurgical Co., Niagara Falls, N. Y.
 Samuel, Frank, & Co., Phila.
 Vanadium Corp. of America, 120 B'way, New York City.

FERRO ALLOYS—Manganese

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
 Lavino, E. J., & Co., Phila.
 Pittsburgh Metallurgical Co., Niagara Falls, N. Y.
 Rogers Brown & Crocker Bros., Inc., 21 East 40th St., N. Y. C.
 Samuel, Frank, & Co., Phila.

FERRO ALLOYS—Molybdenum

Lavino, E. J., & Co., Phila.

FERRO ALLOYS—Silico Manganese

Vanadium Corp. of America, 120 B'way, New York City.

FERRO ALLOYS—Silicon

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
 Lavino, E. J., & Co., Phila.
 Pittsburgh Metallurgical Co., Niagara Falls, N. Y.
 Rogers Brown & Crocker Bros., Inc., 21 East 40th St., N. Y. C.
 Samuel, Frank, & Co., Phila.
 Vanadium Corp. of America, 120 B'way, New York City.

FERRO ALLOYS—Spiegelstein

Rogers Brown & Crocker Bros., Inc., 21 E. 40th St., N. Y. C.

FERRO ALLOYS—Titanium

Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

FERRO ALLOYS—TungstenLavino, E. J., & Co., Phila.
Vanadium Corp. of America, 120 B'way, New York City.**FERRO ALLOYS—Vanadium**

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
 Lavino, E. J., & Co., Phila.
 Vanadium Corp. of America, 120 B'way, New York City.

FERRO ALLOYS—Zirconium

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

FILES AND RASPS

Atkins, E. C., & Co., Indianapolis, Ind.
 Diston, Henry & Sons, Inc., Philadelphia.
 Heller Bros. Co., Newark, N. J.

FILTER CLOTH—Asbestos

Johns-Manville Corp., 292 Madison Ave., New York City.

FILTERS—Pressure or Gravity

Scaffo, Wm. B., & Sons Co., Pgh.

FIRE CLAY

General Refractories Co., Philadelphia, Pa.
 Harbison-Walker Refractories Co., Pgh.

FITTINGS—Hydraulic

Watson-Stillman Co., 71 West St., N. Y. C.

FLANGES—Forged Steel

Cann & Saul Steel Co., Phila.
 Edgewater Steel Co., Pittsburgh.
 Taylor Forge & Pipe Wks., Chicago.

FLANGES—Iron or Steel

Philadelphia (Pa.) Steel & Iron Co.

FLEXIBLE SHAFT EQUIPMENT

Fischer, Chas., Spring Co., 242 Kent Ave., Brooklyn, N. Y.
 Keller Mechanical Engng. Corp., 78 Washington St., Brooklyn, N. Y.

FLOOR ARMORINGBlaw-Knox Co., Pittsburgh.
Hendrick Mfg. Co., Carbondale, Pa.**FLOOR PLATES—See Plates—Floor or**

Cellar Door

FLOORING—Crescoted Wood

Jennison-Wright Co., Toledo

FLOORING—Monolithic

Johns-Manville Corp., 292 Madison Ave., New York City.

FLOORING—SteelBlaw-Knox Co., Pittsburgh.
Central Iron & Steel Co., Harrisburg, Pa.**FLUORSPAR**

Lavino, E. J., & Co., Phila.
 Rogers Brown & Crocker Bros., Inc., 21 E. 40th St., N. Y. C.

FLUX—Steel

Densite Corp. of America, Pittsburgh.

FORGES—Rivet

Buffalo (N. Y.) Forge Co., 492 B'way
 Champion Blower & Forge Co., Lancaster, Pa.
 Hauck Mfg. Co., 128 Tenth St., Bklyn., N. Y.

FORGING MACHINES

Arme Machinery Co., Cleveland.
 National Machinery Co., Timin, O.

FORGINGS—Alloy Steel

Bethlehem (Pa.) Steel Co.
 Cann & Saul Steel Co., Phila.
 Erie (Pa.) Forge Co.
 Heppenstall Co., Phila.
 Machinery Forging Co., The, Cleveland, O.
 National Forge & Ordnance Co., Irvine, Pa.

FORGINGS—Brass, Bronze or Copper

Bossert Corp., The, Utica, N. Y.

FORGINGS—Coin Pressed

Rockford (Ill.) Drop Forge Co.

FORGINGS—Drop, Iron or Steel

Atlas Drop Forge Co., Lansing, Mich.
 Bay City Forge Co., Erie, Pa.
 Belden Machine Co., New Haven, Ct.
 Bethlehem (Pa.) Steel Co.
 Cann & Saul Steel Co., Phila.
 Canton (O.) Forge & Axle Co.
 Clapp, E. D., Mfg. Co., The, 86 S. Division St., Auburn, N. Y.

Cleveland (O.) Hardware Co.
 General Drop Forge Co., Buffalo, N. Y.
 Indianapolis (Ind.) Drop Forging Co.
 Keystone Forging Co., Northumberland, Pa.
 Kilborn & Bishop Co., The, New Haven, Conn.

Lachute Steel Co., St. Louis, Mo.
 Milwaukee (Wis.) Forge & Mch. Co.
 Oliver Iron & Steel Corp., Pittsburgh, Pa.
 Paul, W. P., Co., Phila.
 Philadelphia (Pa.) Steel & Iron Co.
 Rhode Island Tool Co., Providence, B. I.

Rockford (Ill.) Drop Forge Co.
 Storms Drop Forging Co., East Springfield, Mass.

Union Switch & Signal Co., Swissvale, Pa.
 U. S. Body & Forging Co., Inc., Buffalo, N. Y.

Wilcox, D., Mfg. Co., Mechanicsburg, Pa.
 Williams, J. H., & Co., Buffalo, N. Y.

FORGINGS—Hammered

Erie (Pa.) Forge Co.

Machinery Forging Co., The, Cleveland, O.

FORGINGS—Hollow

Erie (Pa.) Forge Co.

National Forge & Ordnance Co., Irvine, Pa.

FORGINGS—Hydraulic Press, Iron or

Steel

Atlas Drop Forge Co., Lansing, Mich.
 Bethlehem (Pa.) Steel Co.
 Erie (Pa.) Forge Co.
 Pittsburgh (Pa.) Forge & Iron Co.

FORGINGS—Manganese Steel

Manganese Steel Forge Co., Phila.

FORGINGS—Stainless Steel

Kilborn & Bishop Co., The, New Haven, Conn.

FORGINGS—Upset

Bethlehem (Pa.) Steel Co.
 Canton (O.) Forge & Axle Co.
 Neely Nut & Bolt Co., Pgh.
 Rockford (Ill.) Drop Forge Co.

FORMING AND COILING MACHINES

Yoder Co., The, Cleveland.

FOUNDRY EQUIPMENT AND SUPPLIES

Clifton Mchry. Co., Cincinnati.
 National Engineering Company, Chicago.
 Northern Engineering Wks., 212 Chene St., Detroit.
 Sly, W. W., Mfg. Co., Cleveland, O.

FROGS AND SWITCHES—Railway

Bethlehem (Pa.) Steel Co.

FURNACES—Billet or Ingot Heating

Hagan, Geo. J., Co., Pittsburgh.
 Surface Combustion Co., 2375 Dorr St., Toledo.
 Swindell-Dressler Corp., Box 1753, Pgh.

FURNACES—Blast

Freyn Engineering Co., Chicago.
 McKee, Arthur G., & Co., Cleve.
 Muskegon (Mich.) Boiler Wks.
 Pennsylvania Engng. Wks., New Castle, Pa.

FURNACES—Crucible

Swindell-Dressler Corp., Box 1753, Pgh.

FURNACES—Electric Steel Melting

Detroit (Mich.) Electric Furnace Co.
 Pittsburgh (Pa.) Electric Furnace Corp.
 Swindell-Dressler Corp., Box 1753, Pgh.

FURNACES—Enameling

Carborundum Co., The, Perth Amboy, N. J.

FURNACES—Forging

Best, W. N., Corp., 295 5th Ave., N. Y. C.
 Holcroft & Co., Detroit.
 Koenig, S. C., 50 Church St., N. Y. C.
 Surface Combustion Co., 2375 Dorr St., Toledo.
 Swindell-Dressler Corp., Box 1753, Pgh.

FURNACES—Heat Treating, Automatic

Hest Duty Electric Co., Milwaukee.
 Holcroft & Co., Detroit.
 Hydro Mfg. Co., 295 Varick St., N. Y. C.
 Rockwell, W. S., Co., 50 Church St., N. Y. C.
 Surface Combustion Co., 2375 Dorr St., Toledo.

FURNACES—Heat Treating, Cyanide or

Lead

American Electric Furnace Co., Boston.
 Amer. Gas Furnace Co., Elizabeth, N. J.
 Hevi Duty Electric Co., Milwaukee.
 Hydro Mfg. Co., 295 Varick St., N. Y. C.
 Surface Combustion Co., 2375 Dorr St., Toledo.

FURNACES—Heat Treating, Electric

American Electric Furnace Co., Boston.
 Electric Furnace Co., Salem, Ohio.
 Hagan, Geo. J., Co., Pittsburgh.
 Hevi Duty Electric Co., Milwaukee.
 Holcroft & Co., Detroit.
 Hoskins Mfg. Co., Detroit.
 Rockwell, W. S., Co., 50 Church St., N. Y. C.
 Strong, Carlisle & Hammond Co., Cleve.
 Swindell-Dressler Corp., Box 1753, Pgh.

FURNACES—Heat Treating, Oil or Gas

Amer. Gas Furnace Co., Elizabeth, N. J.
 Anthony Co., The, Long Island City, N. Y.
 Best, W. N., Corp., 295 5th Ave., N. Y. C.
 Economy Furnace Co., Chicopee, Mass.
 Electric Furnace Co., Salem, Ohio.
 Hagan, Geo. J., Co., Pittsburgh.
 Holcroft & Co., Detroit.
 Hydro Mfg. Co., 295 Varick St., N. Y. C.
 Rockwell, W. S., Co., 50 Church St., N. Y. C.
 Surface Combustion Co., 2375 Dorr St., Toledo.
 Strong, Carlisle & Hammond Co., Cleve.
 Swindell-Dressler Corp., Box 1753, Pgh.

FURNACES—High-Speed Steel

American Electric Furnace Co., Boston.
 Surface Combustion Co., 2375 Dorr St., Toledo.
 Swindell-Dressler Corp., Box 1753, Pgh.

FURNACES—Non-Ferrous Melting

American Electric Furnace Co., Boston.
 Detroit (Mich.) Electric Furnace Co.
 Surface Combustion Co., 2375 Dorr St., Toledo.

FURNACES—Open Hearth

Laughlin, Alex., & Co., Pgh.
 Stevens, Arthur L., Corp., Chicago.
 Swindell-Dressler Corp., Box 1753, Pgh.

FURNACES—Rivet Heating

Surface Combustion Co., 2375 Dorr St., Toledo.

FURNACES—Salt Bath

Economy Furnace Co., Chicopee, Mass.

FURNACING—Wire, Annealing & Gal-

vanizing

Surface Combustion Co., 2375 Dorr St., Toledo.
 Vaughn Mchry. Co., Cuyahoga Falls, O.

FUSE METAL

Platt Bros. & Co., The, Waterbury, Ct.

FUSES—Electric

Jefferson Electric Co., Chicago.

GAGES—Pressure and Vacuum

Bristol Co., Waterbury, Ct.

GAGES—Thread Lead

Jones & Lamson Mch. Co., Springfield, Vt.

GALVANIZING

Cattle, Joseph P., & Bros., Phila.

Meaker Co., The, Chicago.

GALVANIZING EQUIPMENT—Electro

Meaker Co., The, Chicago.

GALVANIZING PLANTS—For Sheets

Aetna-Standard Eng. Co., Youngstown, O.

Meaker Co., The, Chicago.

United Engng. & Fdry. Co., Pgh.

GALVANIZING & TINNING EQUIP-

MENT—Wire

Vaughn Mchry. Co., Cuyahoga Falls, O.

GAS CLEANERS

Research Corp., 405 Lexington Ave., N. Y. C.

GAS CLEANING PLANTS

Flinn & Dreffeln Co., Chicago.

Freyn Engineering Co., Chicago.

GAS—Exhausters

Connersville (Ind.) Blower Co., Inc., The.

Roots, P. H. & F. M., Co., The, Con-

nersville, Ind.

Willbraham-Green Blower Co., Pitts-

town, Pa.

GAS PRODUCERS

Duff Patents Co., Inc., Pgh.

Flinn & Dreffeln Co., Chicago.

Koppers Construction Co., The, Pgh.

Swindell-Dressler Corp., Box 1753, Pgh.

Wood, H. D., & Co., Philadelphia.

GAS RECOVERY COKE OVENS

Koppers Construction Co., The, Pgh.

GAS WASHERS

Brassett, H. A., & Co., Chicago.

Freyn Engineering Co., Chicago.

GASKETS—Asbestos, Metal or Rubber

Johns-Manville Corp., 292 Madison Ave., New York City.

GASKETS—Felt

Booth Felt Co., inc., The, 477-478 19th

St., Bklyn.

Continental Felt Co., 890 B'way, N. Y. C.

Felters Co., The, Boston, Mass.

GATES—Blast

Rockwell, W. S., Co., 50 Church St., N. Y. C.

GATES—Ore Bin

Freyn Engng. Co., Chicago.

GEAR CUTTING

Akron (O.) Gear & Engng. Co.

Bethlehem (Pa.) Steel Co.

Dundore Mfg. Co., Reading, Pa.

Earle Gear & Machine Co., Phila.

Ferguson Gear Co., Gastonia, N. C.

Foot Bros. Gear & Mch. Co., Dept. 33,

111 N. Canal St., Chicago.

Grant Gear Works, Boston.

Hartford (Ct.) Special Mchry. Co.

Hindley Gear Co., Phila.

Jones, W. A., Fdry. & Mch. Co., 4434

W. Roosevelt Road, Chicago.

Philadelphia (Pa.) Gear Works

Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

GEAR CUTTING MACHINES

Brown & Sharpe Mfg. Co., Prov., R. I.

Whitton, D. E., Mch. Co., New London, Ct.

GEAR DRIVES—Herringbone

Lewis Fdry. & Mch. Co., Pgh.

GEAR HOBBING MACHINES

Barber-Colman Co., Rockford, Ill.

Gould & Eberhardt, Newark, N. J.

GEARS—Bevel

Caldwell, H. W., & Son Co., Chicago, Ill.

Earle Gear & Machine Co., Phila.

Ferguson Gear Co., Gastonia, N. C.

Foot Bros. Gear & Mch. Co., Dept. 33,

111 N. Canal St., Chicago.

Grant Gear Works, Boston.

Hartford (Ct.) Special Mchry. Co.

Jones, W. A., Fdry. & Mch. Co., 4434

W. Roosevelt Road, Chicago.

Philadelphia (Pa.) Gear Works

GEARS—Cast

Caldwell, H. W., & Son Co., Chicago, Ill.

GEARS—Enclosed Herringbone Transmission

Foot Bros. Gear & Mch. Co., Dept. 33,
111 N. Canal St., Chicago.

GEARS—Heat Treated

Foot Bros. Gear & Mch. Co., Dept. 33,
111 N. Canal St., Chicago.

GEARS—Herringbone

Caldwell, H. W. & Son Co., Chicago, Ill.
Earle Gear & Machine Co., Phila.
Falk Corp., Milwaukee.
Foot Bros. Gear & Mch. Co., Dept. 33,
111 N. Canal St., Chicago.
Philadelphia (Pa.) Gear Works

GEARS—Machine Cut

Caldwell, H. W. & Son Co., Chicago, Ill.
Foot Bros. Gear & Mch. Co., Dept. 33,
111 N. Canal St., Chicago.
Jones, W. A., Fdry. & Mch. Co., 4434
W. Roosevelt Road, Chicago.

GEARS—Machine Molded

Caldwell, H. W. & Son Co., Chicago, Ill.
Jones, W. A., Fdry. & Mch. Co., 4434
W. Roosevelt Road, Chicago.
Poele Engng. & Mch. Co., Balto., Md.

GEARS—Non-Metallic

Akron (O.) Gear & Engng. Co.
Chicago (Ill.) Rawhide Mfg. Co., 1313
Elston Ave.
Foot Bros. Gear & Mch. Co., Dept. 33,
111 N. Canal St., Chicago.
Grant Gear Works, Boston.
Horsburgh & Scott Co., Cleve.
Philadelphia (Pa.) Gear Works

GEARS—Rawhide

Chicago (Ill.) Rawhide Mfg. Co., 1313
Elston Ave.
Ferguson Gear Co., Gastonia, N. C.
Foot Bros. Gear & Mch. Co., Dept. 33,
111 N. Canal St., Chicago.
Jones, W. A., Fdry. & Mch. Co., 4434
W. Roosevelt Road, Chicago.

GEARS—Speed Reducing

Caldwell, H. W. & Son Co., Chicago, Ill.
Cleveland (O.) Worm & Gear Co.
Foot Bros. Gear & Mch. Co., Dept. 33,
111 N. Canal St., Chicago.
Hindley Gear Co., Phila.
Horsburgh & Scott Co., Cleve.
Jones, W. A., Fdry. & Mch. Co., 4434
W. Roosevelt Road, Chicago.
Philadelphia (Pa.) Gear Works
Poele Engng. & Mch. Co., Balto., Md.

GEARS—Spiral

Ferguson Gear Co., Gastonia, N. C.
Foot Bros. Gear & Mch. Co., Dept. 33,
111 N. Canal St., Chicago.

GEARS—Spir

Boston Gear Works Sales Co., Norfolk
Downs, Mass.
Caldwell, H. W. & Son Co., Chicago, Ill.
Earle Gear & Mach. Co., Phila.
Foot Bros. Gear & Mch. Co., Dept. 33,
111 N. Canal St., Chicago.
Grant Gear Works, Boston.
Hartford (Ct.) Special Mchry. Co.
Horsburgh & Scott Co., Cleve.
Jones, W. A., Fdry. & Mch. Co., 4434
W. Roosevelt Road, Chicago.
Philadelphia (Pa.) Gear Works

GEARS—Worm

Akron (O.) Gear & Engng. Co.
Caldwell, H. W. & Son Co., Chicago.
Cleveland (O.) Worm & Gear Co.
Ferguson Gear Co., Gastonia, N. C.
Foot Bros. Gear & Mch. Co., Dept. 33,
111 N. Canal St., Chicago.
Grant Gear Works, Boston.
Hartford (Ct.) Special Mchry. Co.
Hindley Gear Co., Phila.
Horsburgh & Scott Co., Cleve.
Jones, W. A., Fdry. & Mch. Co., 4434
W. Roosevelt Road, Chicago.
Philadelphia (Pa.) Gear Works

GEARS—Worm, Speed Reducers

Caldwell, H. W. & Son Co., Chicago.
Cleveland (O.) Worm & Gear Co.
De Laval Steam Turbine Co., Trenton, N. J.
Foot Bros. Gear & Mch. Co., Dept. 33,
111 N. Canal St., Chicago.
Jones, W. A., Fdry. & Mch. Co., 4434
W. Roosevelt Road, Chicago.
Philadelphia (Pa.) Gear Works

GENERATORS—Acetylene

Air Reducing Sales Co., 60 East 42nd
St., N. Y. C.

GENERATORS—Electric

Lincoln Electric Co., Cleveland.

GENERATORS—Electric, Second Hand

Belyea Co., Inc., 147 W. 18th St., N.
Y. C.
Motor Repair & Mfg. Co., Cleveland, O.
Zelnicker in St. Louis, Mo.

GENERATORS—Electropiating

Meeker Co., The, Chicago.

GLUE HEATERS

Dart, E. M., Mfg. Co., Prov., R. 1.

GOVERNORS—Air Compressor

Westinghouse Traction Brake Co., Wil-
merding, Pa.

GRATING—Flooring, Sidewalk, Etc.

Blaw-Knox Co., Pittsburgh.
Hendrick Mfg. Co., Carbondale, Pa.

GRATING—Steel

Blaw-Knox Co., Pittsburgh.

**GRINDING AND POLISHING MA-
CHINES**

Black & Decker Mfg. Co., The, Towson,
Md.
Bridgeport (Ct.) Safety Emery Wheel
Co., Inc.

Caldwell, Geo. H., Lancaster, Pa.
Cincinnati Electrical Tool Co., Cincinnati,
Ohio.

Excelsior Tool & Mch. Co., East St.
Louis, Ill.

Norton Co., Worcester, Mass.
Safety Grinding Wheel & Mch. Co., The,
Springfield, O.

Springfield Mfg. Co., Bridgeport, Ct.
Sterling Grinding Wheel Co., Tiffin, Ohio.

GRINDING MACHINES—Cam

Landis Tool Co., Waynesboro, Pa.

**GRINDING MACHINES—Cutter and
Reamer**

Landis Tool Co., Waynesboro, Pa.
Thompson Grinder Co., Springfield, O.

GRINDING MACHINES—Cylindrical

Brown & Sharpe Mfg. Co., Prov., R. I.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES—Die

Bignall & Keeler Mch. Wks., Edwards-
ville, Ill.

GRINDING MACHINES—Disc

Gardner Mach. Co., Heloit, Wis.
Production Mch. Co., Greenfield, Mass.

GRINDING MACHINES—Drill

Sellers, William, & Co., Inc., Phila.

GRINDING MACHINES—Flexible Shaft

Keller Mechanical Engng. Corp., 78
Washington St., Brooklyn, N. Y.

GRINDING MACHINES—Internal

Landis Tool Co., Waynesboro, Pa.

**GRINDING MACHINES—Machine
Knives**

Atkins, E. C., & Co., Indianapolis, Ind.
Bridgeport (Ct.) Safety Emery Wheel Co.,
Inc.

**GRINDING MACHINES—Portable Elec-
tric**

Standard Electrical Tool Co., The, Cin-
c.

**GRINDING MACHINES—Portable Pneu-
matic**

Cleveland (O.) Pneumatic Tool Co., The.
Warner & Swasey Co., The, Cleveland.

GRINDING MACHINES—Roll

Landis Tool Co., Waynesboro, Pa.

GRINDING MACHINES—Second Hand

Morey & Co., Inc., 410 Broome St.
N. Y. C.

GRINDING MACHINES—Snagging

Warner & Swasey Co., The, Cleveland.

GRINDING MACHINES—Spring

Sleeper & Hartley, Inc., Worcester, Mass.

GRINDING MACHINES—Surface

Abrasive Machine Tool Co., F. Prov., R. I.
Blanchard Mach. Co., Cambridge, Mass.
Bridgeport (Ct.) Safety Emery Wheel Co.,
Inc.

GRINDING MACHINES—Universal

Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

Simmons Mach. Tool Corp., Albany, N. Y.
Thompson Grinder Co., Springfield, O.

GRINDING MACHINES—Valve

Defiance (O.) Machine Works

**GRINDING MACHINES—Vertical Sur-
face**

Blanchard Mach. Co., Cambridge, Mass.

**GRINDING WHEEL DRESSERS AND
CUTTERS**

Atkins, E. C., & Co., Indianapolis, Ind.
Caldwell, Geo. H., Lancaster, Pa.
Dickinson, Thos. L., 34 Gold St., N. Y. C.

GRINDING WHEELS

Atkins, E. C., & Co., Indianapolis, Ind.
Carborundum Co., The, Niagara Falls,
N. Y.

New York Belting & Packing Co., 91-93
Chambers St., N. Y. C.

Norton Co., Worcester, Mass.
Safety Grinding Wheel & Mch. Co., The,
Springfield, O.

Simmons Saw & Steel Co., Fitchburg,
Mass.

Springfield Mfg. Co., Bridgeport, Ct.
Sterling Grinding Wheel Co., Tiffin, Ohio.

GUTTERS

Newport (Ky.) Rolling Mill Co.

**HACK SAW BLADES—See Saws—Hack
Saw Blades****HACK SAW MACHINES**

Armstrong-Blum Mfg. Co., Chicago.
Atkins, E. C., & Co., Indianapolis, Ind.
Peetees Machine Co., Racine, Wis.

Racine Tool & Mch. Co., 1755 State St.,
Racine, Wis.

HAMMER RAMS

Heppenstall Co., Pittsburgh.

HAMMERS—Air

Nazel Engng. & Mch. Wks., Phila.

**HAMMERS—Belt or Motor Driven (Forg-
ing)**

Barbour-Stockwell Co., Cambridge, Mass.
Chambersburg (Pa.) Engng. Co.

Moloch Fdry. & Mch. Co., Kaukauna, Wis.
Nazel Engng. & Mch. Wks., Phila.

**HAMMERS—Belt or Motor Driven (Sheet
Metal)**

Quickwork Co., The (Not Incorporated—
H. Collier Smith, Owner), St. Mary's
Ohio.

Yoder Co., The, Cleveland.

HAMMERS—Drop

Chambersburg (Pa.) Engng. Co.
Industrial Brownhoist Corp., Cleveland.

Morgan Engng. Co., Alliance, O.
Standard Machinery Co., Auburn, R. I.

HAMMERS—Pneumatic

Cleveland (O.) Pneumatic Tool Co., The

HAMMERS—Pneumatic Forging

Sullivan Machinery Co., Chicago.

HAMMERS—Rawhide

Chicago (Ill.) Rawhide Mfg. Co., 1313
Elston Ave.

HAMMERS—Steam

Industrial Brownhoist Corp., Cleveland.
Morgan Engng. Co., Alliance, O.

HANGERS—Factory Door

Myers, F. E. & Bro. Co., Ashland, O.

HANGERS—Shaft

American Pulley Co., Philadelphia
Hyman, Joseph, & Sons, Phila.

Jones, W. A., Fdry. & Mch. Co., 4434
W. Roosevelt Road, Chicago.

HARDNESS TESTING MACHINES

Shore Instrument & Mfg. Co., Inc., Jam-
malca, L. I., N. Y.

Wilson-Maclean Co., Inc., 738 E. 143d
St., N. Y. C.

HARDWARE—Carriage and Wagon

Clapp, E. D., Mfg. Co., The, 86 S. Di-
vision St., Auburn, N. Y.

HEADING MACHINES

National Mchry. Co., Tiffin, Ohio.

HEAT TREATING

General Machine Wks., York, Pa.
Parish Pressed Steel Co., Reading, Pa.

HEATERS—Unit

Buffalo (N. Y.) Forge Co., 492 B'way.

**HEATING AND VENTILATING APPA-
RATUS**

Buffalo (N. Y.) Forge Co., 492 B'way

HINGES—Wrought Brass Butt

Veeder-Root, Inc., Hartford, Ct.

HINGES—Wrought Steel & Brass

Hager, C., & Sons Hinge Mfg. Co., St.
Louis, Mo.

HOBS

Barber-Colman Co., Rockford, Ill.

HOISTING MACHINES

Shepard Niles Crane & Hoist Corp.,
Montour Falls, N. Y.

HOISTS—Air

Dake Engine Co., Grand Haven, Mich.
Detroit (Mich.) Hoist & Mach. Co.

Hanna Eng. Works, Chicago.
Independent Pneumatic Tool Co., Chicago.

Northern Engineering Wks., 212 Chene
St., Detroit.

Ridgway, Craig & Son Co., Coatesville,
Pa.

HOISTS—Chain

American Monorail Co., The, Cleveland.
Harrington Co., The, Phila.

Reading (Pa.) Chain & Block Corp.
Robbins & Myers, Inc., Springfield, Ohio.

Union Mfg. Co., New Britain, Conn.

HOISTS—Electric

American Crane Co., Inc., The, Friend-
ship, N. Y.

American Engineering Co., Aramingo and
Cumberland Sts., Philadelphia.

American Monorail Co., The, Cleveland.
Box Crane & Hoist Corp., Phila.

**Browning, Victor R., & Co., Inc., Cleve-
land, Ohio.**

Detroit (Mich.) Hoist & Mach. Co.

Euclid (O.) Crane & Hoist Co.
Harnischfeger Corp., Milwaukee.

Mallory Machry. Corp., Baltimore.
Maris Brothers, Inc., Phila.

Milwaukee (Wis.) Electric Crane & Hoist
Corp.

Northern Engineering Wks., 212 Chene
St., Detroit.

Payne, N. B., & Co., 25 Church St.,
N. Y. C.

Reading (Pa.) Chain & Block Corp.

Robbins & Myers, Inc., Springfield, Ohio.

Shepard Niles Crane & Hoist Corp.,
Reading, Pa.

Shepard Niles Crane & Hoist Corp.,
Montour Falls, N. Y.

HOISTS—Electric Traveling

American Engineering Co., Aramingo and
Cumberland Sts., Philadelphia.

Box Crane & Hoist Corp., Phila.

Cleveland Electric Tramrail, Wickliffe, O.

Euclid (O.) Crane & Hoist Co.

Harnischfeger Corp., Milwaukee.

Milwaukee (Wis.) Electric Crane & Hoist
Corp.

Northern Engineering Wks., 212 Chene
St., Detroit.

Reading (Pa.) Chain & Block Corp.

Robbins & Myers, Inc., Springfield, Ohio.

Shepard Niles Crane & Hoist Corp.,
Montour Falls, N. Y.

HOISTS—SKIP

Bartlett, C. O. & Snow Co., Cleveland.

HOLDERS—Nipple

Curtis & Curtis Co., Bridgeport, Ct.

HONING MACHINES

Barnes Drill Co., Inc., Rockford, Ill.

HOOKS—Wire

Titchener, E. H., & Co., Binghamton,
N. Y.

HOOPS AND BANDS

Ryerson, Jos. T., & Son, Inc., Chicago.

HOSE—Air, Oil, Steam and Water

New York Belting & Packing Co., 91-93
Chambers St., N. Y. C.

HYDRANTS—Fire

Wood, R. D., & Co., Philadelphia.

HYDRAULIC MACHINERY

American Fluid Motors Co., 2416 Ar-
amingo Ave., Philadelphia.

Anker Engng. Co., Phila.

Bethlehem (Pa.) Steel Co.

Birdsboro (Pa.) Steel Fdry. & Mch. Co.

Chambersburg (Pa.) Engng. Co.

Dudgeon, Richard, Inc., 24-26 Columbia
St., New York City.

Elmer, Chas. F., Engng. Wks., Chicago.

French Oil Mill Mchry. Co., Piquette, O.

Lake Erie Engng. Corp., Buffalo, N. Y.

Morgan Engineering Co., Alliance, O.

Southwark Fdry. & Mch. Co., Phila.

Watson Stillman Co., 71 West St., N. Y. C.

Wood, R. D., & Co., Philadelphia.

HYPODERMIC NEEDLE TUBING

Summit Tubing Co., Bridgeport, Mont-
gomery County, Pa.

ICE HANDLING MACHINERY

Lewis-Shepard Co., 122 Walnut St.,
Watertown Station, Boston.

INDUCTION STEEL ELECTRIC

Heppenstall Co., Pittsburgh.

INGOT MOLDS

Bethlehem (Pa.) Steel Co.

Shenango-Penn. Mold Co., Pittsburgh.

Valley Mould & Iron Corp., Hubbard, O.

INGOTS—Aluminum

Erdle Perforating Co., Rochester, N. Y.

INGOTS—Phosphor Bronze

Phosphor Bronze Smelting Co., Phila.

</

IRON—Staybolt

Bethlehem (Pa.) Steel Co.
Ryerson, Jos. T. & Son, Inc., Chicago.

IRON BARS

Pittsburgh (Pa.) Forge & Iron Co.

JACKS—Hydraulic

Dudgum, Richard, Inc., 24-26 Columbia St., New York City.

KEYS—Riveted

Western Wire Products Co., St. Louis.

KEYSEATING MACHINES

Baker Bros., Inc., Toledo, O.

LACING—Belt, Rawhide or Leather

Chicago (Ill.) Rawhide Mfg. Co., 1313 Elston Ave.
Graton & Knight Co., Worcester, Mass.

LAMPS—Mercury Vapor

General Electric Vapor Lamp Co., Hoboken, N. J.

LATHE DOGS

West Steel Casting Co., The, Cleveland.
William H. J. & Co., Buffalo, N. Y.

LATHES—Automatic

Hullard Co., The, Bridgeport, Ct.
Jones & Lamson Mfg. Co., Springfield, Vt.
Leffland, R. K., Mch. Tool Co., Cinn.
Monarch Mch. Tool Co., The, Sidney, O.

LATHES—Bench

Rivett Lathes & Grinder Corp., Boston

LATHES—Brass

Wagner & Swasey Co., The, Cleveland.

LATHES—Chucking

Jones & Lamson Mfg. Co., Springfield, Vt.
Warner & Swasey Co., The, Cleveland.

LATHES—Crankschaft

Leffland, R. K., Mch. Tool Co., Cinn.

LATHES—Engine

American Tool Works Co., Cinc.
Cincinnati (O.) Lathe & Tool Co.
Consolidated Mch. Tool Corp. of America, Rochester, N. Y.

LATHES—Horizontal

Hill, Charles & Co. of Chicago, 647 W. Washington Blvd., Chicago, Ill.
Leffland, R. K., Mch. Tool Co., Cinn.
Lodge & Shipley Mch. Tool Co., Cinn.
Monarch Mch. Tool Co., The, Sidney, O.
Monarch Mch. Co., Philadelphia, Pa.
Oakline & Sexton Mch. Co., Columbus, O.
Reed-Prentice Corp., Worcester, Mass.
Ryerson, Jos. T. & Son, Inc., Chicago.

LATHES—Roll

Leola Foundry & Mch. Co., Pgh.
United Engrg. & Fdr. Co., Pgh.

LATHES—Second-Hand

Brownell Mch. Co., Prov., R. I.
Eastern Mch. Co., Cincinnati.
Miles Mch. Co., Saginaw, W. S. Mich.
More & Co., Inc., 410 Broom St., N. Y. C.
Russell Mch. Co., Pgh.
Seifert-Listad Mch. Co., Dayton, O.
Simmons Mch. Tool Corp., Albany, N. Y.

LATHES—Spinning

Adriance Mch. Works, Inc., 82 Richard St., Brooklyn, N. Y.

LATHES—Turret

Barbours & Oliver, Cleve.
Hullard Co., The, Bridgeport, Ct.
Cincinnati (O.) Lathe & Tool Co.
Jones & Lamson Mfg. Co., Springfield, Vt.
Warner & Swasey Co., The, Cleveland.

LEAD BURNING

Gross Lead Burning & Coating Corp., Cleveland.

LEAD-LINED APPARATUS

Gross Lead Burning & Coating Corp., Cleveland.

LEATHER—Cup

Chicago (Ill.) Rawhide Mfg. Co., 1313 Elston Ave.

LEATHER—Hydraulic

Chicago (Ill.) Rawhide Mfg. Co., 1313 Elston Ave.

LEVELING MACHINES

Schatz Mfg. Co., The, Poughkeepsie, N. Y.

LEVELS—Precision Machine Aligning

Universal Boring Mch. Co., Hudson, Mass.

LIMESTONE—Low Silica

Baker, J. E., Co., York, Pa.

LINING—Converter

Edge Hill Silica Rock Co., New Brunswick, N. J.

LINING—Cupola

Edge Hill Silica Rock Co., New Brunswick, N. J.

LIQUIDATORS

Llewellyn, Thomas J., & Co., Pgh.

LOCK WASHER MACHINERY

Sleeper & Hartley, Inc., Worcester, Mass.

LOCOMOTIVES—Electric

Atlas Car & Mfg. Co., Cleve.

LOCOMOTIVES—Gasoline

Plymouth (O.) Locomotive Wks.

LOCOMOTIVES—Industrial

Plymouth (O.) Locomotive Wks.

LOCOMOTIVES—Storage Battery

Atlas Car & Mfg. Co., Cleve.

LUGS—Terminal

Wolverine Tube Co., Detroit.

LUMBER—Cresoted or Zinc Treated

Century Wood Preserving Co., Pgh.

MACHINE WORK

Ans. Max. Mch. Co., The, Bridgeport, Conn.

Cavagnaro, John J., Harrison, N. J.
Cowdrey, C. H., Machine Co., 30 Summer St., Fitchburg, Mass.

Fabricated Steel Products Co., Wheeling, W. Va.

General Mch. Works, York, Pa.
Moloch Pdry. & Mch. Co., Kaukauna, Wis.

Royersford (Pa.) Pdry. & Mch. Co., Inc.

MACHINERY DEALERS

Brownell Mch. Co., Prov., R. I.
Delta Equipment Co., Philadelphia.

Donahue Steel Products Co., 1609 West 7th St., Chicago.

Dony, D. E., Rochester, N. Y.
Eastern Mch. Co., Cincinnati.

Exley, E. L., Mch. Co., Chicago.
Fremont & Co., 119 Bank St., N. Y. C.

General Mch. Corp., Boston, Mass.
Hill, Charles & Co. of Chicago, 647 W. Washington Blvd., Chicago, Ill.

Hyman-Michaelis Co., Chicago, Ill.
Johnson, Wm. C., & Sons Mch. Co., St. Louis, Mo.

MacGabe, T. B., Philadelphia, Pa.
Marr-Gallbreath Mch. Co., Pgh.

Miles Mch. Co., Saginaw, W. S. Mich.
Monarch Mch. Co., Philadelphia.

Morey & Co., Inc., 410 Broom St., N. Y. C.
Noble Mch. Co., Inc., 297 Centre St., N. Y. C.

O'Brien Mch. Co., Phila.
Randle Mch. Co., 1772 Powers St., Cincinnati, Ohio.

Reliance Mch. Sales Co., Pgh.
Ryerson, Jos. T. & Son, Inc., Chicago.

Schoonmaker, A. G., & Sons, Inc., 30 Church St., New York City.

Seifert-Listad Mch. Co., Dayton, O.
Simmons Mch. Tool Corp., Albany, N. Y.

Smith, H. A., Mch. Co., Syracuse, N. Y.
Wachs-Gregg & Co., Chicago.

West Penn Mch. Co., Pittsburgh.
White, A. D. Mch. Co., Chicago.

Zelicker in St. Louis, Mo.

MACHINISTS—Contracting

Konigsow, Otto, Mfg. Co., Cleve.

MAGNESITE—Brick or Dead Burnt

Carborundum Co., The, Niagara Falls, N. Y.

Harbison-Walker Refractories Co., Pgh.
Lavinio, E. J., & Co., Phila.

MAGNETIC EQUIPMENT

Magnetic Mfg. Co., 626 So. 28th St., Milwaukee, Wis.

MAGNETS—Electric Industrial

Dings Magnetic Separator Co., Milwaukee.

MAGNETS—Lifting

Cutler-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., Cleve.

MALLETS—Rawhide

Chicago (Ill.) Rawhide Mfg. Co., 1313 Elston Ave.

MANGANESE METAL

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

MANHOLE STEPS

Nicetown Plate Washer Co., Inc., Phila.

MARKING MACHINES

Noble & Westbrook Mfg. Co., Hartford, Ct.

METAL SPECIALTIES

American Pulley Co., Philadelphia

Amer. Spring & Mfg. Corp., Holley, Mich.
Beardsley & Wolcott Mfg. Co., Waterbury, Conn.

Bossert Corp., The, Utica, N. Y.
Cuyahoga Spring Co., Cleve.

Detroit (Mich.) Metal Specialty Corp.
Geuder, Paeschke & Frey Co. (Contract Mfg. Div.), Milwaukee.

Globe Mch. & Stg. Co., Cleve.
Hassall, John, Inc., Clay & Oakland Sts., Brooklyn, N. Y.

Torrington (Ct.) Co.
Worcester (Mass.) Pressed Steel Co.

York (Pa.) Corrugating Company.

METALLINE

Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.

MICA SCHIST

Edge Hill Silica Rock Co., New Brunswick, N. J.

MILLING MACHINES—Horizontal

Consolidated Mch. Tool Corp. of America, Rochester, N. Y.

Defiance (O.) Mch. Wks.
Kearney & Trecker Corp., Milwaukee.

MILLING MACHINES—Planer

Kearney & Trecker Corp., Milwaukee.
Ryerson, Jos. T. & Son, Inc., Chicago.

MILLING MACHINES—Planer Type

Sellers, William, & Co., Inc., Phila.

MILLING MACHINES—Second-Hand

Eastern Mch. Co., Cincinnati.
Simmons Mch. Tool Corp., Albany, N. Y.

MILLING MACHINES—Universal

Brown & Sharpe Mfg. Co., Prov., R. I.
Ryerson, Jos. T. & Son, Inc., Chicago.

MILLING MACHINES—Vertical

Reed-Prentice Corp., Worcester, Mass.

MIXING MACHINES—Sand

Bartlett, C. O. & Snow Co., Cleveland.
National Engineering Co., Chicago.

MOLDING MACHINES—Jarring (Air)

Arade Mfg. Co., Freeport, Ill.
Herman Pneumatic Mch. Co., Pittsburgh.

Nicholls, Wm. H., Co., Inc., 91st Ave. & 129th St., Richmond Hill, N. Y.

MOLDING MACHINES—Rollover (Hand and Power Operated)

Arade Mfg. Co., Freeport, Ill.
Herman Pneumatic Mch. Co., Pittsburgh.

MOLDING MACHINES—Sand Throwing

Beardsley & Piper Co., Chicago, Ill.

MOLDING MACHINES—Stripping Plate

Nicholls, Wm. H., Co., Inc., 91st Ave. & 129th St., Richmond Hill, N. Y.

MONEL METAL

International Nickel Co., Inc., 67 Wall St., New York City.

MONORAIL SWITCHES AND TURN-TABLES

Reading (Pa.) Chain & Block Corp.

MONORAIL—Overhead

American Monorail Co., The, Cleveland.
Reading (Pa.) Chain & Block Corp.

MOTORS—Electric

Allis-Chalmers Mfg. Co., Milwaukee.
Century Electric Co., St. Louis, Mo.

Leland Electric Co., The, Dayton, Ohio.
Lincoln Electric Co., Cleveland.

Ohio Electric Mfg. Co., Cleve.
Robbins & Myers, Inc., Springfield, Ohio.

MOTORS—Electric—Fractional H.P.

Ohio Electric Mfg. Co., Cleveland.

MOTORS—Electric, Second-Hand

Belyea Co., Inc., 147 W. 18th St., N. Y. C.
Delta Equipment Co., Philadelphia.

Motor Repair & Mfg. Co., Cleveland, O.
O'Brien Mch. Co., Phila.

NAILS—Wire

Bethlehem (Pa.) Steel Co.
Wheeling (W. Va.) Steel Corp.

NICKEL

International Nickel Co., Inc., 67 Wall St., New York City.

NICKEL ANODES—Rolled or Cast

Seymour (Ct.) Mfg. Co.

NITROGEN

Air Reduction Sales Co., 60 East 42nd St., N. Y. C.

NUMBERING MACHINES—For Metal

Noble & Westbrook Mfg. Co., Hartford, Ct.

NUT MAKING MACHINERY

Budd-Ranney Eng. Co., The, Columbus, O.
National Mch. Co., Tiffin, Ohio.

NUTS—Acorn

Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Castellated

Western Screw Products Co., St. Louis.

NUTS—Cold Punched

Oliver Iron & Steel Corp., Pittsburgh, Pa.
Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Hot Pressed

Oliver Iron & Steel Corp., Pittsburgh, Pa.
Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Milled

National Armco Co., The, Cleveland.
Westfield (Mass.) Nut Co.

NUTS—Semi-Finished

Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Semi-Finished

Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Semi-Finished

Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Semi-Finished

Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Semi-Finished

Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Semi-Finished

Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Semi-Finished

Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Semi-Finished

Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Semi-Finished

Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Thumb Malienble

Philadelphia (Pa.) Hardware & Malienble Iron Wks., Inc.

Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

OIL STONES

Carborundum Co., The, Niagara Falls, N. Y.

ORES—Chrome, Lump and Ground

Harbison-Walker Refractories Co., Pgh.
Lavinio, E. J., & Co., Phila.

ORES—Iron

Cleveland (O.) Cliffs Iron Co.
Hanna Furnace Corp., The, Detroit, Mich.

Pickands, Mather, & Co., Cleveland.
Pilling & Co., Inc., Phila.

Rogers Brown & Crocker Bros., Inc., 31 East 40th St., N. Y. C.

ORES—Manganese

Lavinio, E. J., & Co., Phila.

OVENS—Baking

Drying Systems, Inc., Chicago, Ill.
Gehrich Oven Co., Inc., Long Island City, N. Y.

Surface Combustion Co., 2375 Dorr St., Toledo.

OVENS—Coke & By-Product Recovery

Koppers Construction Co., The, Pgh.

OVENS—Core and Mold

Drying Systems, Inc., Chicago, Ill.
Gehrich Oven Co., Inc., Long Island City, N. Y.

Hokroft & Co., Detroit.
Young Bros. Co., Detroit.

OVENS—Cross Regenerative

Koppers Construction Co., The, Pgh.

OVENS—Drying

Detroit (Mich.) Sheet Metal Wks.
Drying Systems, Inc., Chicago, Ill.

Young Bros. Co., Detroit.

OVENS—Enameling and Japanning

Carborundum Co., The, Perth Amboy, N. J.

Drying Systems, Inc., Chicago, Ill.
Gehrich Oven Co., Inc., Long Island City, N. Y.

Shenango-Penn Mold Co., Pittsburgh.
Tennessee Coal, Iron & R.R. Co., Bir-
mingham, Ala.
Walter-Wallingford & Co., Cincinnati.
Wickwire Spencer Steel Co., 41 E. 42nd,
N. Y. C.

PIG IRON—Low Phosphorus
Chateaugay Ore & Iron Co., 26 Liberty
St., N. Y. C.

PILING—Steel Sheet
Bethlehem (Pa.) Steel Company.

PINIONS—Wire and Rod
Rathbone, A. B., & J., Palmer, Mass.

PINS—Airbrake
Champion Rivet Co., Cleveland, Ohio.

PINS—Chain
Champion Rivet Co., Cleveland, Ohio.

PINS—Coupler
Champion Rivet Co., Cleveland, Ohio.

PIPE—Cast Iron, B. & S. and Flanged
Wood, R. D., & Co., Philadelphia.

PIPE—Chrome Alloy
Habruck & Wilcox Tube Co., 85 Liberty
St., N. Y. C.

PIPE—Forged Steel
Kellogg, M. W., Co., The, 225 Bdw.,
N. Y. C.

PIPE—Genuine Wrought Iron
Keating, E. F., Co., 452 Water St.,
N. Y. C.

PIPE—Hammer Welded
National Tube Co., Pittsburgh.

PIPE—New and Second-Hand
Albert & Davidson Pipe Corp., 2nd Ave.,
30-51st St., Bklyn., N. Y.
Albert Pipe Supply Co., Inc., Berry and
N. 13th St., Bklyn., N. Y.
Greenpoint Iron & Pipe Co., Inc., 187-
197 Maspeth Ave., Bklyn., N. Y.
Hudson Pipe & Supply Co., Bayonne,
N. J.
L. & D. Pipe Supply Co., Inc., 1100
Flushing Ave., Bklyn., N. Y.

PIPE—Riveted Steel
Abendroth & Root Mfg. Co., Newburgh,
N. Y.

PIPE—Seamless Steel
Habruck & Wilcox Tube Co., 85 Liberty
St., N. Y. C.
Spang, Chalfant & Co., Inc., Pittsburgh,
Pa.

PIPE—Spiral Riveted
Abendroth & Root Mfg. Co., Newburgh,
N. Y.
Taylor Forge and Pipe Works, Chicago.

PIPE—Standard, Black and Galvanized
Bethlehem (Pa.) Steel Co.
Jones & Laughlin Steel Corp., Pgh.
Keating, E. F., Co., 452 Water St.,
N. Y. C.
National Tube Co., Pittsburgh.
Republic Steel Corp., Youngstown, Ohio.
Smith, A. O., Corp., Milwaukee.
Spang, Chalfant & Co., Inc., Pittsburgh,
Pa.
Wheeling (W. Va.) Steel Corp.

PIPE—Welded, Electric
Smith, A. O., Corp., Milwaukee.
Republic Steel Corp., Youngstown, Ohio.

PIPE—Wrought Iron
Keating, E. F., Co., 452 Water St.,
N. Y. C.

PIPE BENDING MACHINES
Newbold, R. S., & Son Co., Norristown, Pa.

PIPE COVERING—Asbestos
Johns-Manville Corp., 292 Madison Ave.,
New York City.

PIPE CUTTING MACHINES
Murphy Mch. & Tool Co., 951 Porter
St., Detroit.
Newbold, R. S., & Son Co., Norristown, Pa.

**PIPE CUTTING AND THREADING
MACHINES**
Aetna-Standard Eng. Co., Youngstown, O.
Bignall & Keeler Mch. Wks., Edwards-
ville, Ill.
Curtis & Curtis Co., 337 Garden St.,
Bridgeport, Ct.
Merrell Mfg. Co., Toledo.
Murphy Mch. & Tool Co., 951 Porter
St., Detroit.
Pipe Machry. Co., The, Cleveland.
Saunders, D., Sons, Yonkers, N. Y.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

PIPE FITTINGS
Kellogg, M. W., Co., The, 225 Bdw.,
N. Y. C.

PISTON RODS
Heppenstall Co., Pittsburgh.

PLANING MACHINES—Metal

American Tool Works Co., Cincl.
Cleveland (O.) Planer Co., The.
Consolidated Mch. Tool Corp. of America
Rochester, N. Y.
Gray, G. A., Co., Cincl.
Ryerson, Jos. T., & Son, Inc., Chicago.
Sellers, William, & Co., Inc., Phila.

PLANING MACHINES—Open Side
Cleveland (O.) Planer Co., The.
Gray, G. A., Co., Cincl.

PLANING MACHINES—Second Hand
Miles Mchry. Co., Saginaw, W. S.,
Mich.

PLANTS FOR SALE
Penn Seaboard Corp., Phila., Pa.

PLATERS' CLEANING COMPOUND
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., 22 Thames St., N. Y.

PLATES—Felloe
Wrought Washer Mfg. Co., Milwaukee.

PLATES—Floor or Cellar Door
Alan Wood Steel Co., Conshohocken, Pa.
American Pressed Steel Co., Phila.
Carnegie Steel Co., Pittsburgh.
Central Iron & Steel Co., Harrisburg, Pa.
Inland Steel Co., Chicago.

PLATES—Iron or Steel
Alan Wood Steel Co., Conshohocken, Pa.
American Pressed Steel Co., Phila., Pa.
Bethlehem (Pa.) Steel Company.
Carnegie Steel Co., Pittsburgh.
Central Iron & Steel Co., Harrisburg, Pa.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pgh.
Newport (Ky.) Rolling Mill Co.
Ryerson, Jos. T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co.,
Birmingham, Ala.

PLATES—Manganese Steel
Manganese Steel Forge Co., Phila.

PLATFORMS—Skid
Lewis-Shepard Co., 122 Walnut St.,
Watertown Station, Boston.

PLATING—Electro
Meaker Co., The, Chicago.

PLATING EQUIPMENT—Automatic
Meaker Co., The, Chicago.

PLATING EQUIPMENT—Chromium
Meaker Co., The, Chicago.

PLUGS—Core Hole
Hubbard, M. D., Spring Co., Pontiac,
Mich.

**POINTING & THREADING
MACHINERY**
Economy Engng. Co., The, Willoughby, O.

POLISHING & BUFFING MACHINES
Cincinnati Electrical Tool Co., Cincinnati,
Ohio.
Divine Brothers Co., Utica, N. Y.

POLISHING MACHINES—Belt
Production Mch. Co., Greenfield, Mass.

POLISHING WHEELS
Divine Brothers Co., Utica, N. Y.

POWER TRANSMITTING MACHINERY
American Pulley Co., Philadelphia
Caldwell, H. W., & Son Co., Chicago, Ill.
Falk Corp., Milwaukee.
Jones, W. A., Fdry. & Mch. Co., 4434
W. Roosevelt Road, Chicago.

PREHEATERS—Air
Blaw-Knox Co., Pittsburgh.

PRESS ATTACHMENTS
Littell, F. J., Mch. Co., Chicago.
Marquette Tool & Mfg. Co., Chicago, Ill.

PRESSED METAL PARTS
Beardsley & Wolcott Mfg. Co., Water-
bury, Conn.
Champion Sheet Metal Co., Inc., Cortland,
N. Y.
Detroit (Mich.) Metal Specialty Corp.

PRESSED STEEL PARTS
American Pulley Co., Philadelphia
Bossert Corp., The, Utica, N. Y.
Detroit (Mich.) Metal Specialty Corp.
Geuder, Paeschke & Frey Co. (Contract
Mfg. Div.), Milwaukee.
Metal Specialty Co., 1533 W. Sixth St.,
Cincinnati.
New England Pressed Steel Co., 1 Wash-
ington Ave., Natick, Mass.
Parish Pressed Steel Co., Reading, Pa.
Pennsylvania Car Co., Kansas City, Kans.
Pressed & Welded Steel Prods. Co., Long
Island City, N. Y.
Worcester (Mass.) Pressed Steel Co.
York (Pa.) Corrugating Co.

PRESSES—Bending or Straightening
Watson-Stillman Co., 71 West St., N. Y.

PRESSES—Die
Watson-Stillman Co., 71 West St., N. Y.

PRESSES—Drop

Bliss, E. W. Co., 53rd St. & 2nd Ave.,
Brooklyn, N. Y.
Standard Machinery Co., Auburn, R. I.

PRESSES—Extrusion

Robertson, John, Co., 123 Water St.,
Brooklyn, N. Y.
Watson-Stillman Co., 71 West St., N. Y.

PRESSES—Foot

Adriance Mch. Works, Inc., 82 Richards
St., Bklyn., N. Y.
Baird Machine Co., Bridgeport, Ct.
Shuster, F. B., Co., New Haven, Ct.
Taylor & Fenn Co., Hartford, Ct.

PRESSES—Forging

Lucas Mch. Tool Co., Cleve.
Watson-Stillman Co., 71 West St., N. Y.

PRESSES—Forging

Morgan Engineering Co., Alliance, O.
United Engineering & Fdry. Co., Pgh.
Watson-Stillman Co., 71 West St., N. Y.

PRESSES—Forming and Bending

Cincinnati (O.) Shaper Co., The.
Dreiss & Krump Mfg. Co., Chicago.
Streine Tool & Mfg. Co., New Bremen, O.

PRESSES—Hot and Cold Plate

Watson-Stillman Co., 71 West St., N. Y.

PRESSES—Hydraulic

Bethlehem (Pa.) Steel Co.
Birdsboro (Pa.) Steel Fdry. & Mch. Co.
Elmes, Chas. F., Engng. Works, Chicago.
French Oil Mill Machry. Co., Piqua, O.
Galland-Henning Mfg. Co., Milwaukee.
Lake Erie Engng. Corp., Buffalo, N. Y.
Morgan Engineering Co., Alliance, O.
Robertson, John, Co., 123 Water St.,
Brooklyn, N. Y.
Watson-Stillman Co., 71 West St., N. Y.
Wood, R. D., & Co., Philadelphia.

PRESSES—Multiple Plunger

Waterbury (Ct.) Farrel Fdry. & Mch. Co.

PRESSES—Percussion

Schatz Mfg. Co., The, Poughkeepsie, N. Y.

PRESSES—Power

Adriance Machine Works, Inc., 82
Richards St., Bklyn., N. Y.
Baird Machine Co., Bridgeport, Ct.
Bliss, E. W. Co., 53rd St. & 2nd Ave.,
Brooklyn, N. Y.
Cincinnati (O.) Shaper Co., The.
Cleveland (O.) Punch & Shear Wks. Co.
Ferracute Machine Co., Bridgeton, N. J.
Hymann, Joseph, & Sons, Phila.
Manville E. J. Mch. Co., Waterbury, Ct.
Marquette Tool & Mfg. Co., Chicago, Ill.
Minster (O.) Machine Co.
New Albany (Ind.) Mch. Mfg. Co.
Niagara Machine & Tool Works, Buffalo,
N. Y.
Olin, George A., & Co., Inc., Newark, N. J.
Pels, Henry, & Co., 90 West St., N. Y. C.
Rockford (Ill.) Iron Works.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Standard Machinery Co., Auburn, R. I.
Toledo (O.) Mch. & Tool Co.
V & O Press Co., Hudson, N. Y.
Waterbury (Ct.) Farrel Fdry. & Mch. Co.
Zeh & Hahnenmann Co., Newark, N. J.

PRESSES—Roofing and Corrugating
Streine Tool & Mfg. Co., New Bremen, O.

PRESSES—Scrap Bundling

Galland-Henning Mfg. Co., Milwaukee.
Standard Machinery Co., Auburn, R. I.

PRESSES—Trimming

Toledo (O.) Mch. & Tool Co.

PULLEY MACHINERY

Arey Drilling Mch. Co., Cincinnati, O.

PULLEYS—Belt (Pressed Steel)

American Pulley Co., Philadelphia

PULLEYS—Car (Electric)

Caldwell, H. W., & Son Co., Chicago, Ill.

PULLEYS—Friction Clutch

Caldwell, W. E., Co., 260 Brandels St.,
Louisville, Ky.
Jones, W. A., Fdry. & Mch. Co., 4434
W. Roosevelt Road, Chicago.

PULLEYS—Iron, Solid and Split

Caldwell, W. E., Co., 260 Brandels St.,
Louisville, Ky.
Jones, W. A., Fdry. & Mch. Co., 4434
W. Roosevelt Road, Chicago.

PULLEYS—Magnetic

Cutler-Hammer, Inc., Milwaukee.
Dingus Magnetic Separator Co., Milwaukee.
Magnetic Mfg. Co., 626 So. 28th St.,
Milwaukee, Wis.

**PULLEYS—Motor and Machine (Com-
pressed Spruce)**
American Pulley Co., Philadelphia.

PULLEYS—Steel, Rim Solid and Split
Hyman, Joseph, & Sons, Phila.

PULVERIZERS

American Pulverizer Co., St. Louis, Mo.
Bartlett, C. O., & Snow Co., Cleveland.
Bethlehem (Pa.) Steel Co.

PULVERIZERS—Coal

Bartlett, C. O., & Snow Co., Cleveland.
Bethlehem (Pa.) Steel Co.

PUMPS—Boiler Feed

Manitowoc (Mich.) Iron Works Co.
Morris Mch. Works, Baldwinville, N. Y.

PUMPS—Centrifugal

Allis-Chalmers Mfg. Co., Milwaukee.
De Laval Steam Turbine Co., Trenton, N. J.
Manitowoc (Mich.) Iron Works Co.
Morris Mch. Works, Baldwinville, N. Y.
Penna. Pump & Compressor Co., Easton,
Pa.

PUMPS—Electric

Myers, F. E., & Bro. Co., Ashland, O.

PUMPS—Hand & Power

Myers, F. E., & Bro. Co., Ashland, O.

PUMPS—Hydraulic

American Fluid Motors Co., 2410 Ara-
mingo Ave., Philadelphia.
Elmes, Chas. F., Engng. Works, Chicago.
Galland-Henning Mfg. Co., Milwaukee.
LaPointe Mch. Tool Co., The, Hudson,
Mass.
Watson-Stillman Co., 71 West St., N. Y.
Wood, R. D., & Co., Philadelphia.

PUMPS—Pneumatic Air Lift

Sullivan Machinery Co., Chicago.

PUMPS—Rotary Positive

Connersville (Ind.) Blower Co., Inc., The.
Roots, P. H. & F. M., Co., The, Con-
nersville, Ind.
Wilbraham-Green Blower Co., Pottstown,
Pa.

PUMPS—Vacuum

Bury Compressor Co., Erie, Pa.
Paper & Textile Mchry. Co., The, San-
dusky, Ohio.
Penna. Pump & Compressor Co., Easton,
Pa.
Sullivan Machinery Co., Chicago.

PUNCHES—Pneumatic

Hanna Engineering Wks., Chicago.

PUNCHES AND DIES

Cleveland (O.) Punch & Shear Wks. Co.
Marchant, Geo. F., Co., Chicago.
Richards, I. P., Co., Providence, R. I.

PUNCHING AND SHEARING MA- CHINES

Beatty Mch. & Mfg. Co., Hammond, Ind.
Bertch & Co., Cambridge City, Ind.
Buffalo (N. Y.) Forge Co., 492 E. Way
Cleveland (O.) Punch & Shear Wks. Co.
Consolidated Mch. Tool Corp. of America,
Rochester, N. Y.
Exelstior Tool & Mch. Co., East St.
Louis, Ill.
Hendley & Whittemore Co., Beloit, Wis.
Long & Allstatter Co., Hamilton, O.
Palmer, Henry, & Co., 90 West St., N. Y. C.
Quickwork Co., The (Not Incorporated—
H. Collier Smith, Owner) St. Marys, O.
Ryerson, Jos. T., & Son, Inc., Chicago.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Smith, David H., & Sons, Inc., Ft. of
51st St., Brooklyn, N. Y.
Thomas Spacing Mch. Co., Pgh.

PURIFIER—Steel

Densite Corp. of America, Pittsburgh

PURIFIERS—Oil

De Laval Steam Turbine Co., Trenton,
N. J.
National Acme Co., The, Cleveland.

PURIFIERS—Steam

Blaw-Knox Co., Pittsburgh.

PYROMETERS—Indicating

Bristol Co., Waterbury, Ct.
Hoskins Mfg. Co., Detroit.
Wilson-Meeulen Co., Inc., 738 E. 143d
St., N. Y. C.

PYROMETERS—Purifiers, Gas

Research Corp., 405 Lexington Ave.,
N. Y. C.

RACKS—Industrial Storage

Lewis-Shepard Co., 122 Walnut St.,
Watertown Station, Boston.

RAIL SPLICE BARS

Ames, W., & Co., Jersey City, N. J.

RAILS

Bethlehem (Pa.) Steel Co.
Cohen, Louis, & Son, Wilkes-Barre, Pa.
Foster, L. B., Co., Pittsburgh.
Frank, M. K., Pittsburgh.
Inland Steel Co., Chicago.
Morrison Railway Supply Corp., Buffalo,
N. Y.
Tennessee Coal, Iron & R. R. Co., Bir-
mingham, Ala.

RAILS—Relaying

Continental Iron & Steel Co., 33 Bacter
St., N. Y. C.
Foster, L. B., Co., Pittsburgh.
Frank, M. K., Pittsburgh, Pa.
Perry, Buxton, Doane Co., Boston.
Sherwood, E. C., 43 Church St., N. Y. C.
Zelmecker in St. Louis, Mo.

(ALL THESE COMPANIES CARRY AN AD IN THIS ISSUE)
ALPHABETICAL INDEX PAGES 214-216

RAILWAY EQUIPMENT AND SUPPLIES

Foster, L. B. Co., Pittsburgh.
Johns-Manville Corp., 292 Madison Ave., New York City.
Morrison Railway Supply Corp., Buffalo, N. Y.
Scullin Steel Co., St. Louis, Mo.
Zelnicker in St. Louis, Mo.

REAMERS—Adjustable and Expansion

Barber-Colman Co., Rockford, Ill.
Brubaker, W. L., & Bros. Co., 50 Church St., N. Y. C.
Cleveland (O.) Twist Drill Co.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Union Twist Drill Co., Athol, Mass.
Whitman & Barnes, Inc., Detroit, Mich.

REFRACTORIES—See Brick—Cement—Facing Clay and Fire Clay**REGRINDING METAL SAWS**

Birmingham (Ala.) Grinding Works.

RINGS—Iron or Steel

Akron-Sells Co., Akron, Ohio.
Edgewater Steel Co., Pittsburgh.
Heppner Steel Co., Pittsburgh.
Milwaukee (Wis.) Forge & Mch. Co.

RIVET MAKING MACHINERY

Acme Machinery Co., Cleve.
Manville, E. J., Mch. Co., Waterbury, Ct.
National Mch. Co., Tiffin, Ohio.

RIVET SETS

Cleveland (O.) Punch & Shear Wks. Co.
Hunter Saw & Mch. Co., 5660 Butler St., Pgh.
Maitland, Geo. F., Co., Chicago.
Whitman & Barnes, Inc., Detroit, Mich.

RIVETING MACHINES

Allen, John P., Co., 372 Gerard Ave., N. Y.
Buffalo (N. Y.) Forge Co., 492 B'way.
Hanna Engrg. Works, Chicago.
Shuster, F. B., Co., New Haven, Conn.
Watson-Stillman Co., 71 West St., N. Y.
Wood, R. D., & Co., Philadelphia.

RIVETS

Bethlehem (Pa.) Steel Co.
Champion Rivet Co., Cleveland, Ohio.
Clark Bros. Bolt & Nut Co., Milldale, Conn.
Seely Nut & Bolt Co., Pgh.
Oliver Iron & Steel Corp., Pittsburgh, Pa.
Phane & Alwood Mfg. Co., Waterbury, Conn.
Progressive Mfg. Co., Torrington, Ct.
Reed & Prince Mfg. Co., Worcester, Mass.
Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago.

RODS—Drill

Globe Wire Company, Div. of the Fifth-Sterling Steel Co., Sharpsburg, Pa.
Pittsburgh Tool Steel Wire Co., Monaca, Pa.

RODS—Nickel Silver

Seymour (Ct.) Mfg. Co.

RODS—Phosphor Bronze

Phosphor Bronze Smelting Co., Phila.
Seymour (Ct.) Mfg. Co.

RODS—Welding

Air Reduction Sales Co., 69 East 42nd St., N. Y. C.

RODS—Welding, Manganese Steel

Manganese Steel Forge Co., Phila.

RODS—Wire

Washburn Wire Co., Inc., 118th & Harlem River, N. Y. C.
Wickwire Spencer Steel Co., 41 E. 42nd, N. Y. C.

ROLL HEATERS—Electric

Frey Engineering Co., Chicago.

ROLLING MACHINERY—Cold Rolling

Bliss, E. W. Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Kane & Rouch, Syracuse, N. Y.
Lewis Foundry & Mch. Co., Pgh.
Yoder Co., The, Cleveland.

ROLLING MACHINERY—Corrugating

Streine Tool & Mfg. Co., New Bremen, O.

ROLLING MACHINERY—Sheet Leveler

Aetna-Standard Eng. Co., Youngstown, O.

ROLLING MACHINERY—Sheet Metal

Lewis Foundry & Mch. Co., Pgh.
Streine Tool & Mfg. Co., New Bremen, O.
Yoder Co., The, Cleveland.

ROLLING MACHINERY—Sheet Oiling

Aetna-Standard Eng. Co., Youngstown, O.
Streine Tool & Mfg. Co., New Bremen, O.

ROLLING MILL MACHINERY

Aetna-Standard Eng. Co., Youngstown, O.
Birdsboro (Pa.) Steel Fdry & Mch. Co.
Bliss, E. W. Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Hoagland's, M. Sons Co., Rockaway, N. J.

Hyde Park (Pa.) Fdry. & Mch. Co.
Lewis Fdry. & Mch. Co., Pgh.
National Roll & Fdry. Co., Avonmore, Pa.
Newbold, R. S., & Son Co., Norristown, Pa.
Quickwork Co., The (Not Incorporated—H. Collier Smith, Owner) St. Marys, O.
Standard Machinery Co., Auburn, R. I.
Treadwell Engineering Co., Easton, Pa.
United Engrg. & Fdry. Co., Pgh.
Waterbury (Ct.) Farrel Fdry. & Mch. Co.

ROLLING MILLS—Copper Rod and Sheet

Hoagland's, M. Sons Co., Rockaway, N. J.

ROLLS—Alloy Steel

Duquesne Steel Fdry. Co., Pittsburgh, Pa.
United Engrg. & Fdry. Co., Pgh.

ROLLS—Bending and Straightening

Bertsch & Co., Cambridge City, Ind.
Bethlehem (Pa.) Steel Co.
Buffalo (N. Y.) Forge Co., 492 B'way.

ROLLS—Grass, Bronze, Copper, Iron, Manganese, Aluminum

Paper & Textile Mchry. Co., The, Sandusky, Ohio.

ROLLS—Galvanizing

Erie (Pa.) Forge Co.

ROLLS—Sand Chilled Iron and Steel

Aetna-Standard Eng. Co., Youngstown, O.
American Steel Foundries, Chicago.
Birdsboro (Pa.) Steel Fdry & Mch. Co.
Hoagland's, M. Sons Co., Rockaway, N. J.
Hyde Park (Pa.) Fdry. & Mch. Co.
Lewis Fdry. & Mch. Co., Pittsburgh, Pa.
National Roll & Fdry. Co., Avonmore, Pa.
United Engrg. & Fdry. Co., Pittsburgh.

ROLLS—Special Hardened

Bethlehem (Pa.) Steel Co.

ROOFING—Cement Tile

American Cement Tile Mfg. Co., 803 Oliver Bldg., Pgh.

ROOFING—Concrete

Austin Co., The, Cleveland.

ROOFING—Special Copper Bearing Steel

Newport (Ky.) Rolling Mill Co.

ROOFING AND SIDING—Corrugated and Plain

Johns-Manville Corp., 292 Madison Ave., New York City.
Newport (Ky.) Rolling Mill Co.
Ryerson, Jos. T., & Son, Inc., Chicago.

ROOFING AND SIDING—(Genuine Open Hearth Iron)

Newport (Ky.) Rolling Mill Co.

ROOFING AND SIDING—Iron and Steel

Newport (Ky.) Rolling Mill Co.

RUST PREVENTIVES

American Chemical Paint Co., Ambler, Pa.

RUST REMOVING

American Chemical Paint Co., Ambler, Pa.

SAND—Core

Industrial Silica Corp., Youngstown, Ohio.

SAND—Furnace Bottom

Industrial Silica Corp., Youngstown, Ohio.

SAND—Molding

Rogers Brown & Crocker Bros., Inc., 21 E. 40th St., N. Y. C.

SAND—Sand Blast

Cape May (N. J.) Sand Co.
Industrial Silica Corp., Youngstown, Ohio.
Patch-Wegner Co., Rutland, Vt.

SAND—Steel Molding

Cape May (N. J.) Sand Co.
Industrial Silica Corp., Youngstown, Ohio.

SAND BLAST EQUIPMENT AND MACHINES

Arcade Mfg. Co., Freeport, Ill.
Mott Sand Blast Mfg. Co., Inc., Chl.
Pangborn Corp., Hagerstown, Md.
Sly, W. W., Mfg. Co., Cleveland, O.

SAND CUTTING AND SCREENING MACHINES

Bartlett, C. O. & Snow Co., Cleveland.

SAND HANDLING EQUIPMENT

Bartlett, C. O. & Snow Co., Cleveland.
Beardsley & Piper Co., Chicago, Ill.
Hayward Co., 50 Church St., N. Y. C.
National Engineering Co., Chicago.

SAND MILLS

Bartlett, C. O. & Snow Co., Cleveland.
National Engineering Co., Chicago.

SAWING MACHINES—Metal

Atkins, E. C., & Co., Indianapolis, Ind.
Cochrane-Bly Co., Rochester, N. Y.
Earle Gear & Mch. Co., Phila.
Espin-Lucas Mch. Works, Phila.
Peerless Machine Co., Racine, Wis.
Racine Tool & Mch. Co., 1755 State St., Racine, Wis.
Tannetwits Wks., The, Grand Rapids, Mich.

SAWS—Band and Hack for Metal

Armstrong-Rum Mfg. Co., Chicago.
Atkins, E. C., & Co., Indianapolis, Ind.
Diston, Henry, & Sons, Inc., Phila.
Simonds Saw & Steel Co., Fitchburg, Mass.
Tannetwits Wks., The, Grand Rapids, Mich.

SAWS—Circular, Rip and Cutoff

Atkins, E. C., & Co., Indianapolis, Ind.
Cochrane-Bly Co., Rochester, N. Y.

SAWS—Cold Metal

Atkins, E. C., & Co., Indianapolis, Ind.
Hunter Saw & Mch. Co., 5660 Butler St., Pgh.

SAWS—Friction

Atkins, E. C., & Co., Indianapolis, Ind.
Diston, Henry, & Sons, Inc., Philadelphia.
Ryerson, Jos. T., & Son, Inc., Chicago.

SAWS—Hack Saw Blades

Atkins, E. C., & Co., Indianapolis, Ind.
Darwin & Milner, Inc., Cleveland.
Peerless Mch. Co., Racine, Wis.

SAWS—Hot Metal

Atkins, E. C., & Co., Indianapolis, Ind.
Diston, Henry, & Sons, Inc., Philadelphia.
Hunter Saw & Mch. Co., 5660 Butler St., Pgh.

SAWS—Inserted Tooth, Cold

Diston, Henry, & Sons, Inc., Phila.
Hunter Saw & Mch. Co., 5660 Butler St., Pittsburgh.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS—Milling

Diston, Henry, & Sons, Inc., Phila.

SAWS—Screw Slotting

Atkins, E. C., & Co., Indianapolis, Ind.

SAWS—Sliding Frame

United Engrg. & Fdry. Co., Pgh.

SCALES

Buffalo (N. Y.) Scale Co., 1202 Niagara St.

SCRAP—Iron and Steel

Perry, Buxton, Doane Co., Boston.
Potts, Henry, & Co., Phila.

SCREENS—Perforated Metal

Chicago Perforating Co., Chicago, Ill.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chl.
Hendrick Mfg. Co., Cantonville, Pa.
Mundt, Chas., & Sons, Jersey City, N. J.

SCREENS—Woven Wire

Cleveland (O.) Wire Cloth & Mfg. Co.
Manganese Steel Forge Co., Phila.
Michigan Wire Cloth Co., 2117 Howard St., Detroit.

SCREENS—Woven Wire

Wickwire Spencer Steel Co., 41 E. 42nd, N. Y. C.

SCREW MACHINE PRODUCTS

Barnes, Wallace, Co., The, Bristol, Ct.
Bell, David, Co., Inc., The, Buffalo, N. Y.
Cleveland (O.) Cap Screw Co., The.
Corbin Screw Corp., New Britain, Ct.
Eastern Mch. Screw Corp., New Haven, Ct.
Hartford (Ct.) Machine Screw Co.
Lacey Bros. Mchry. & Tool Co., Detroit, Mich.

SCREW MACHINE PRODUCTS

National Acme Co., The, Cleveland.
Newton Mfg. Co., Plainville, Ct.
Olson Mfg. Co., Worcester, Mass.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Penn Screw & Machine Works, Phila.

SCREW MACHINE PRODUCTS

Progressive Mfg. Co., Torrington, Ct.
Screw Mch. Products Corp., Prov., R. I.
Shlmer, Samuel J., & Sons, Inc., Milton, Pa.
Western Screw Products Co., St. Louis, Mo.

SCREW MACHINERY—Automatic

Cone Automatic Mch. Co., Inc., Windsor, Vt.
National Acme Co., The, Cleveland.

SCREW MACHINERY—Automatic Wood

Cook, Aas S., Co., Hartford, Ct.

SCREW MACHINERY—Hand

Jones & Lamsen Mch. Co., Springfield, Vt.
Warner & Swasey Co., The, Cleveland.

SCREW MACHINERY—Multiple Spindle

Cone Automatic Mch. Co., Inc., Windsor, Vt.
National Acme Co., The, Cleveland.

SCREWS—CAP

Clark Bros. Bolt Co., Milldale, Conn.
Cleveland (O.) Cap Screw Co.
Corbin Screw Corp., New Britain, Ct.

National Acme Co., The, Cleveland.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Reed & Prince Mfg. Co., Worcester, Mass.
Shlmer, Samuel J., & Sons, Inc., Milton, Pa.
Western Screw Products Co., St. Louis, Mo.

SCREWS—Cold Headed

Cleveland (O.) Cap Screw Co., The.

SCREWS—Machine

Corbin Screw Corp., New Britain, Ct.
Progressive Mfg. Co., Torrington, Ct.
Reed & Prince Mfg. Co., Worcester, Mass.

SCREWS—Safety Set

Allen Mfg. Co., The, Hartford, Ct.
Bristol Co., Waterbury, Ct.
Progressive Mfg. Co., Torrington, Ct.
Standard Pressed Steel Co., Jenkintown, Pa.

SCREWS—Set

Allen Mfg. Co., The, Hartford, Ct.
Bristol Co., Waterbury, Ct.
Progressive Mfg. Co., Torrington, Ct.
Standard Pressed Steel Co., Jenkintown, Pa.

SCREWS—Socket, Head, Cap

Allen Mfg. Co., The, Hartford, Ct.
Standard Pressed Steel Co., Jenkintown, Pa.

SCREWS—Thumb Malleable

Philadelphia (Pa.) Hardware & Malleable Iron Wks., Inc.

SCREWS—Wood

Corbin Screw Corp., New Britain, Ct.
Reed & Prince Mfg. Co., Worcester, Mass.

SCYTHE STONES AND WHETSTONES

Carborundum Co., The, Niagara Falls, N. Y.

SECOND-HAND MACHINERY—See Clearing House Section

Armell, James P., Pgh.
Donahue Steel Products Co., 1609 West 74th St., Chicago.

SECOND-HAND MACHINERY—See Clearing House Section

Eastern Mchry. Co., Cincinnati.
Erie (Pa.) Steel Construction Co.
Esley, E. L., Mchry. Co., Chicago.
Farrell Machinery Co., St. Louis, Mo.
Fronment & Co., 150 Bank St., N. Y. C.
Highway Truck Parts Co., Indianapolis, Ind.

SECOND-HAND MACHINERY—See Clearing House Section

Hill, Clarke & Co. of Chicago, 647 W. Washington Blvd., Chicago, Ill.
Ideal Machinery Co., Plainville, Ct.
Johnson, Wm. C., & Sons, Mchry. Co., St. Louis, Mo.

SECOND-HAND MACHINERY—See Clearing House Section

Llewellyn, Thomas J., & Co., Pgh.
Lodge & Shipley Mch. Tool Co., Cincl.
Lummis & Co., Philadelphia, Pa.
MacCabe, T. B., Phila.
Marr-Galbreath Mchry. Co., Pgh.

SECOND-HAND MACHINERY—See Clearing House Section

Miles Mchry. Co., Saginaw, W. S., Mich.
Morey & Co., Inc., 410 Broome St., N. Y. C.
Nelson, A. H., Mch. Co., Bridgeport, Ct.
O'Brien Machinery Co., Phila.

SECOND-HAND MACHINERY—See Clearing House Section

Osborne & Sexton Mchry. Co., Columbus, O.
Oviatt, D. C., & Co., Cleveland.
Penn Seaboard Corp., Phila., Pa.
Randle Mchry. Co., 1772 Powers St., Cincinnati, Ohio.

SECOND-HAND MACHINERY—See Clearing House Section

Reliance Mchry. Sales Co., Pgh.
Ross Power Equip. Co., Indianapolis.
Russell Mch. Co., Pgh.

SECOND-HAND MACHINERY—See Clearing House Section

Ryerson, Jos. T., & Son, Inc., Chicago.
Scully-Jones & Co., Chicago.
Selfreast-Elsad Mchry. Co., Dayton, O.
Simmons Mch. Tool Corp., Albany, N. Y.

SECOND-HAND MACHINERY—See Clearing House Section

Walsh, J. T., Buffalo, N. Y.
White, A. D. Mchry. Co., Chicago.
Zelnicker in St. Louis, Mo.

SEPARATORS—Gas

Research Corp., 405 Lexington Ave., N. Y. C.

SEPARATORS—Magnetic

Dings Magnetic Separator Co., Milwaukee.
Ohio Electric Mfg. Co., Cleveland.

SHAFTING—Cold Drawn

Cumberland (Md.) Steel Co.
Ryerson, Jos. T., & Son, Inc., Chicago.
Union Drawn Steel Co., Republic Bldg., Youngstown, Ohio.

SHAFTING—Smooth Forged or Rough Turned

Erie (Pa.) Forge Co.

SHAFTING—Steel

Bethlehem (Pa.) Steel Co.
Bliss & Laughlin, Inc., Harvey, Ill.
Cumberland (Md.) Steel Co.

SHAFTING—Tubular Material For

National Tube Co., Pittsburgh.

SHAFTING—Turned and Polished

Cumberland (Md.) Steel Co.
Jones & Laughlin Steel Corp., Pgh.

SHAFTING—Turned and Polished

Union Drawn Steel Co., Republic Bldg., Youngstown, Ohio.

SHAPES—Cold Drawn

Union Drawn Steel Co., Republic Bldg., Youngstown, Ohio.

SHAPES—Steel

Phoenix Iron Co., Phila.
Ryerson, Jos. T., & Sons, Inc., Chicago.

SHAPES—Wire

Titchener, E. H., & Co., Binghamton, N. Y.

SHAPING MACHINES—Horizontal

American Tool Works Co., Cincinnati (O.) Shaper Co., The Gould & Eberhardt, Newark, N. J. Monarch Mchry. Co., Philadelphia, Pa. Ryerson, Jos. T., & Sons, Inc., Chicago. Smith & Mills Co., Cincinnati.

SHEAR BLADES AND KNIVES

Aikins, E. C., & Co., Indianapolis, Ind. Heppenstall Co., Pittsburgh. Quickwork Co., The (Not Incorporated)—H. Collier Smith, Owner, St. Marys, O. Yoder Co., The, Cleveland.

SHEARING MACHINES—Alligator

Canton (O.) Fdry. & Mch. Co. Doelger & Kirsten, 3105 Chambers St., Mil. Hendley & Whittemore Co., Beloit, Wis. Hoagland's, M., Sons Co., Rockaway, N. J. Long & Allstatter Co., Hamilton, O. Newbold, R. S., & Son Co., Norristown, Pa. Pels, Henry, & Co., 90 West St., N. Y. C. Smith, David H., & Sons, Inc., Foot of 51st St., B'klyn, N. Y. United Engrg. & Fdry. Co., Pgh.

SHEARING MACHINES—Angle, Hand and Power

Cleveland (O.) Punch & Shear Wks. Co. Pels, Henry, & Co., 90 West St., N. Y. C. Schatz Mfg. Co., The, Poughkeepsie, N. Y. Smith, David H., & Sons, Inc., Foot of 51st St., B'klyn, N. Y. Thomas Spacing Mach. Co., Pgh., Pa.

SHEARING MACHINES—Automatic Alligator

Doelger & Kirsten, 3105 Chambers St., Mil.

SHEARING MACHINES—Bar

Actna-Standard Eng. Co., Youngstown, O. Beatty Mch. & Mfg. Co., Hammond, Ind. Buffalo (N. Y.) Forge Co., 492 B'way. Cleveland (O.) Punch & Shear Wks. Co. Long & Allstatter Co., Hamilton, O. Newbold, R. S., & Son Co., Norristown, Pa. Pels, Henry, & Co., 90 West St., N. Y. C. Schatz Mfg. Co., The, Poughkeepsie, N. Y. Smith, David H., & Sons, Inc., Foot of 51st St., B'klyn, N. Y.

SHEARING MACHINES—Beam and Channel

Buffalo (N. Y.) Forge Co., 492 B'way. Cleveland (O.) Punch & Shear Wks. Co. Pels, Henry, & Co., 90 West St., N. Y. C. Schatz Mfg. Co., The, Poughkeepsie, N. Y. Smith, David H., & Sons, Inc., Foot of 51st St., B'klyn, N. Y.

SHEARING MACHINES—Billet

Buffalo (N. Y.) Forge Co., 492 B'way. Morgan Engineering Co., Alliance, O. Pels, Henry, & Co., 90 West St., N. Y. C. Schatz Mfg. Co., The, Poughkeepsie, N. Y. Smith, David H., & Sons, Inc., Foot of 51st St., B'klyn, N. Y. United Engrg. & Fdry. Co., Pgh.

SHEARING MACHINES—Continuous Automatic

Yoder Co., The, Cleveland.

SHEARING MACHINES—Continuous Sheet & Pack

Strelne Tool & Mfg. Co., New Bremen, O.

SHEARING MACHINES—Doubling and Squaring

United Engrg. & Fdry. Co., Pgh.

SHEARING MACHINES—Metal Slitting

Buffalo (N. Y.) Forge Co., 492 B'way. Hendley & Whittemore Co., Beloit, Wis. Pels, Henry, & Co., 90 West St., N. Y. C. Quickwork Co., The (Not Incorporated)—H. Collier Smith, Owner, St. Marys, O. Smith, David H., & Sons, Inc., Foot of 51st St., B'klyn, N. Y.

SHEARING MACHINES—Metal Slitting Gang

Adriance Mach. Works, Inc., 82 Richards St., B'klyn, N. Y. Quickwork Co., The (Not Incorporated)—H. Collier Smith, Owner, St. Marys, O. Yoder Co., The, Cleveland.

SHEARING MACHINES—Plate

Bertsch & Co., Cambridge City, Ind. Cleveland (O.) Punch & Shear Wks. Co. Drels & Krump Mfg. Co., Chicago. Long & Allstatter Co., Hamilton, O. Morgan Engineering Co., Alliance, O. Newbold, R. S., & Son Co., Norristown, Pa. Niagara Mach. & Tool Wks., Buffalo, N. Y. Pels, Henry, & Co., 90 West St., N. Y. C. Quickwork Co., The (Not Incorporated)—H. Collier Smith, Owner, St. Marys, O. Ryerson, Jos. T., & Sons, Inc., Chicago. Schatz Mfg. Co., The, Poughkeepsie, N. Y. Smith, David H., & Sons, Inc., Foot of 51st St., B'klyn, N. Y. Thomas Spacing Mach. Co., Pgh., Pa. United Engrg. & Fdry. Co., Pgh. Wood, R. D., & Co., Philadelphia. Yoder Co., The, Cleveland.

SHEARING MACHINES—Rotary for Irregular Cutting

Newbold, R. S., & Son Co., Norristown, Pa. Quickwork Co., The (Not Incorporated)—H. Collier Smith, Owner, St. Marys, O. Ryerson, Jos. T., & Sons, Inc., Chicago. Yoder Co., The, Cleveland.

SHEARING MACHINES—Rotary Slitting Gang

Strelne Tool & Mfg. Co., New Bremen, O. Yoder Co., The, Cleveland.

SHEARING MACHINES—Sheet and Plate

Drels & Krump Mfg. Co., Chicago. Quickwork Co., The (Not Incorporated)—H. Collier Smith, Owner, St. Marys, O. Strelne Tool & Mfg. Co., New Bremen, O. Yoder Co., The, Cleveland.

SHEARING MACHINES—Squaring

Drels & Krump Mfg. Co., Chicago. Strelne Tool & Mfg. Co., New Bremen, O. Toledo (O.) Mch. & Tool Co.

SHEET BARS

Andrews Steel Co., Newport, Ky.

SHEET METAL MACHINERY

Adriance Machine Wks., Inc., 82 Richards St., B'klyn, N. Y. Bliss, E. W. Co., 53rd St. & 2nd Ave., Brooklyn, N. Y. Cincinnati (O.) Shaper Co., The Consolidated Mch. Tool Corp. of America, Rochester, N. Y. Drels & Krump Mfg. Co., Chicago. Excelsior Tool & Mch. Co., East St. Louis, Ill. Ferracute Machine Co., Bridgeton, N. J. Kane & Roach, Syracuse, N. Y. Manning, Maxwell & Moore, Inc., 100 E. 12nd Street, N. Y. C. Newbold, R. S., & Son Co., Norristown, Pa. New Albany (Ind.) Mch. Mfg. Co. Niagara Mach. & Tool Wks., Buffalo, N. Y. Ohl, George A., & Co., Inc., Newark, N. J. Quickwork Co., The (Not Incorporated)—H. Collier Smith, Owner, St. Marys, O. Strelne Tool & Mfg. Co., New Bremen, O. Standard Machinery Co., Auburn, R. I. Toledo (O.) Machine & Tool Co. V & O Press Co., Hudson, N. Y. Yoder Co., The, Cleveland.

SHEET METAL WORK

Champion Sheet Metal Co., Inc., Cortland, N. Y. Kelker Blower Co., Inc., Buffalo, N. Y.

SHEETS—Aluminum

Erdle Perforating Co., Rochester, N. Y.

SHEETS—Auto Body

Eastern Rolling Mill Co., Balto., Md. Empire Steel Corp., Mansfield, Ohio. Newport (Ky.) Rolling Mill Co. Newton Steel Co., Youngstown, Ohio. Republic Steel Corp., Youngstown, Ohio.

SHEETS—Black

Bethlehem (Pa.) Steel Company. Empire Steel Corp., Mansfield, Ohio. Inland Steel Co., Chicago. Newport (Ky.) Rolling Mill Co. Republic Steel Corp., Youngstown, Ohio. Ryerson, Jos. T., & Sons, Inc., Chicago. Weirton (W. Va.) Steel Co.

SHEETS—Blue Annealed

Alan Wood Steel Co., Conshohocken, Pa. Bethlehem (Pa.) Steel Co. Central Iron & Steel Co., Harrisburg, Pa. Empire Steel Corp., Mansfield, Ohio. Inland Steel Co., Chicago. Newport (Ky.) Rolling Mill Co. Republic Steel Corp., Youngstown, Ohio. Ryerson, Jos. T., & Sons, Inc., Chicago.

SHEETS—Box Annealed

Empire Steel Corp., Mansfield, Ohio. Newport (Ky.) Rolling Mill Co.

SHEETS—Brass, Bronze, Copper, Nickel Silver or Phosphor Bronze

Phosphor Bronze Smelting Co., Phila. Seymour (Ct.) Mfg. Co.

SHEETS—Copper Steel

Inland Steel Co., Chicago, Ill. Newport (Ky.) Rolling Mill Co.

SHEETS—Electrical

Empire Steel Corp., Mansfield, Ohio. Newport (Ky.) Rolling Mill Co. Republic Steel Corp., Youngstown, Ohio.

SHEETS—Enameling Stock

Empire Steel Corp., Mansfield, Ohio

SHEETS—Enameling Stock (Genuine Open Hearth Iron)

Newport (Ky.) Rolling Mill Co.

SHEETS—For Drawing and Stamping

Eastern Rolling Mill Co., Balto., Md. Empire Steel Corp., Mansfield, Ohio. Fifth-Sterling Steel Co., McKeesport, Pa. Newport (Ky.) Rolling Mill Co. Newton Steel Co., Youngstown, Ohio. Republic Steel Corp., Youngstown, Ohio. Wheeling (W. Va.) Steel Corp.

SHEETS—Full Finished

Eastern Rolling Mill Co., Balto., Md. Empire Steel Corp., Mansfield, Ohio. Newport (Ky.) Rolling Mill Co. Newton Steel Co., Youngstown, Ohio. Republic Steel Corp., Youngstown, Ohio. Seneca Iron & Steel Co., Buffalo, N. Y.

SHEETS—Galvanized, Flat and Corrugated

Bethlehem (Pa.) Steel Co. Empire Steel Corp., Mansfield, Ohio. Inland Steel Co., Chicago. Newport (Ky.) Rolling Mill Co. Republic Steel Corp., Youngstown, Ohio. Ryerson, Jos. T., & Sons, Inc., Chicago. Weirton (W. Va.) Steel Co.

SHEETS—Locomotive Jacket

Newport (Ky.) Rolling Mill Co.

SHEETS—Metal Furniture

Eastern Rolling Mill Co., Balto., Md. Empire Steel Corp., Mansfield, Ohio. Newport (Ky.) Rolling Mill Co. Republic Steel Corp., Youngstown, Ohio. Seneca Iron & Steel Co., Buffalo, N. Y.

SHEETS—Pickled

Newport (Ky.) Rolling Mill Co.

SHEETS—Steel Pipe Blue

Empire Steel Corp., Mansfield, Ohio.

SHEETS—Tin Mill Black

Empire Steel Corp., Mansfield, Ohio.

SHELLS—Brass and Copper

Bridgeport (Conn.) Brass Co.

SHELVING—Steel

Cleveland (O.) Wire Spring Co.

SHINGLES—Metal

Newport (Ky.) Rolling Mill Co.

SHUTTERS—Steel and Wood Bi-Folding

Kinnear Mfg. Co., 817-67 Field Ave., Columbus, Ohio.

SILICON METAL

Electro Metallurgical Sales Corp., 39 E. 42nd St., New York City.

SKIDS—Lift Truck

Lewis-Shepard Co., 122 Walnut St., Watertown Station, Boston.

SLABS

Andrews Steel Co., Newport, Ky. Central Iron & Steel Co., Harrisburg, Pa.

SLINGS—Wire Rope

Roebbing's John A. Sons Co., Trenton, N. J.

BLOTTING MACHINES

Consolidated Mch. Tool Corp. of America, Rochester, N. Y. Nazel Engrg. & Mch. Wks., Phila.

SPACING TABLES—Punching & Shearing

Thomas Spacing Mach. Co., Pgh., Pa.

SPECIAL MACHINERY

Ames, Max, Mach. Co., The, Bridgeport, Conn. Bethlehem (Pa.) Steel Co. Budd-Barney Eng. Co., The, Columbus, O. Bullard Co., The, Bridgeport, Ct. Cook, Asa S. Co., Hartford, Ct. Cowdrey, C. H., Machine Co., 30 Summer St., Fitchburg, Mass. Electric Boat Co., Groton, Conn. Hartford (Ct.) Special Mchry. Co. Hill Clutch Machine & Foundry Co., 6403 Brookwater Ave., N.W., Cleveland, O. Lambert & Todd Mch. Co., Camden, N. J. Langelier Manufacturing Co., Providence, R. I. Little, F. J., Mch. Co., Chicago. Manville, E. J., Mach. Co., Waterbury, Ct. Morgan Engineering Co., Alliance, O. Quickwork Co., The (Not Incorporated)—H. Collier Smith, Owner, St. Marys, O. Southwark Fdry. & Mch. Co., Phila. Treadwell Engineering Co., Easton, Pa. Yoder Co., The, Cleveland.

SPEED REDUCERS

Boston Gear Wks. Sales Co., Norfolk Downs, Mass. Cleveland (O.) Worm & Gear Co. Foote Bros. Gear & Mch. Co., Dept. 33, 111 N. Canal St., Chicago. Jones, W. A., Fdry. & Mch. Co., 4434 W. Roosevelt Road, Chicago. Philadelphia (Pa.) Gear Works. Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

SPIKES

Ames, W., & Co., Jersey City, N. J. Bethlehem (Pa.) Steel Co. Inland Steel Co., Chicago.

SPRING MAKING MACHINERY

Harold Machine Co., Bridgeport, Ct. Sleeper & Hartley, Inc., Worcester, Mass.

SPRINGS—Car

Amer. Spiral Spring & Mfg. Co., Pgh. Miller & Van Winkle, Inc., 18 Bridge St., B'klyn, N. Y.

SPRINGS—Wire, Coil or Flat

American Spiral Spring & Mfg. Co., Pgh. Amer. Spring & Mfg. Corp., Holley, Mich. Barnes-Gibson Raymond, Inc., Detroit. Barnes, Wallace, Co., The, Bristol, Ct. Cleveland (O.) Wire Spring Co. Cook Spring Div. of Barnes-Gibson-Raymond, Inc., Ann Arbor, Mich. Cuyahoga Spring Co., Cleve. Dunbar Bros. Co., Bristol, Ct. Fischer, Chas., Spring Co., 242 Kent Ave., B'klyn, N. Y. Gibson, Wm. D., Co., Chicago. Hubbard, M. D., Spring Co., Pontiac, Mich. Hunter Pressed Steel Co., Lansdale, Pa. Lee Spring Co., Inc., 30 Main St., B'klyn, N. Y. Miller & Van Winkle, Inc., 18 Bridge St., B'klyn, N. Y. Raymond Mfg. Co., Corry, Pa. Washburn Wire Co., Inc., 118th St. & Harlem River, N. Y. C. Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

SPROCKETS

Boston Gear Works Sales Co., Norfolk Downs, Mass. Dundore Mfg. Co., Reading, Pa. Whitney Mfg. Co., Hartford, Ct.

STACKS—Steel

Chicago (Ill.) Bridge & Iron Wks. Meelan, Butler & Construction Co., Lowellville, Ohio. Muskegon (Mich.) Boiler Works.

STAMPINGS OR DRAWINGS—Metal

Amer. Steel & Mfg. Co., Pittsburgh. Akron-Selig Co., Akron, Ohio. American Pulley Co., Philadelphia, Pa. Amer. Spring & Mfg. Corp., Holley, Mich. American Tube & Stng. Plant (The Stanley Wks.), Bridgeport, Conn. Barnes-Gibson Raymond, Inc., Detroit. Barnes, Wallace, Co., The, Bristol, Ct. Beardsley & Wolcott Mfg. Co., Waterbury, Conn. Behringer, E., Sheet Metal Wks., Inc., Newark, N. J. Berger, L. D., Co., Philadelphia, Pa. Bossert Corp., The, Utica, N. Y. Breese Bros. Co., Cincinnati. Bridgeport (Conn.) Brass Co. Burgess-Norton, Mfg. Co., Geneva, Ill. Champion Sheet Metal Co., Inc., Cortland, N. Y.

Cleveland (O.) Hardware Co.

Cook, H. C., Co., Ansonia, Ct.

Cook Spring Div. of Barnes-Gibson-Raymond, Inc., Ann Arbor, Mich.

Cuyahoga Spring Co., Cleveland.

Davis Brake Beam Co., Jonestown, Pa.

Detroit (Mich.) Metal Specialty Corp.

Eastern Tool & Supp. Co., Inc., Saugus, Mass.

Erdle Perforating Co., Rochester, N. Y.

Fischer, Chas., Spring Co., 242 Kent Ave., B'klyn, N. Y.

General Mach. & Mfg. Co., Bridgeport, Ct.

Geuder, Paeschke & Frey Co. (Contract Mfg. Div.), Milwaukee.

Globe Mach. & Stng. Co., Cleve.

Great Lakes Pressed Steel Corp., Buffalo, N. Y.

Hager, C., & Sons Hinge Mfg. Co., St. Louis, Mo.

Hassall, John, Inc., Clay & Oakland Sts., Brooklyn, N. Y.

Hill, N. N., Brass Co., The, East Hampton, Conn.

Hubbard, M. D., Spring Co., Pontiac, Mich.

Huebel Mfg. Co., Inc., Newark, N. J.

Hunter Pressed Steel Co., Lansdale, Pa.

Konigsberg, Otto, Mfg. Co., Cleve.

Lansing (Mich.) Stng. Co.

Lee Spring Co., Inc., 30 Main St., B'klyn, N. Y.

Master Products Co., The, 6420 Park Ave., S. E., Cleveland, O.

Metal Specialty Co., 1533 W. Sixth St., Cincinnati.

Miller & Van Winkle, Inc., 18 Bridge St., B'klyn, N. Y.

Mullins Mfg. Corp., Salem, Ohio.

New England Pressed Steel Co., 1 Washington Ave., Natick, Mass.

Parish Pressed Steel Co., Reading, Pa.

Patent Specialty Supply Co., Cambridge, N. Y.

Penn Jersey Metal Products Corp., Camden, N. J.

Pennsylvania Car Co., Kansas City, Kan.

Plume & Atwood Mfg. Co., Waterbury, Conn.

Pressed & Welded Steel Prods. Co., Long Island City, N. Y.

Rockford (Ill.) Iron Wks.

St. Paul (Minn.) Corrugating Co.

Seymour (Ct.) Products Co., The.

Smith, Thomas, Co., 236 Grove St., Worcester, Mass.

Stanley Works, The, New Britain, Ct.

Stolper Steel Prods. Corp., Milwaukee, Wis.

Torrington (Ct.) Co.

Veeder-Root, Inc., Hartford, Ct.

Worcester (Mass.) Pressed Steel Co.

Worcester (Mass.) Stamped Metal Co.

York (Pa.) Corrugating Co.

Youngstown Steel Car Corp., Niles, Ohio.

STAMPS—Steel Alphabets and Figures

Noble & Westbrook Mfg. Co., Hartford, Ct.

Schwerdtle Stamp Co., Bridgeport, Ct.

STAPLES—Wire

Titchener, E. H., & Co., Binghamton, N. Y.

STEEL—Alloy

Alan Wood Steel Co., Conshohocken, Pa.

Allen, Edgar, Steel Co., Inc., 745 Washington St., N. Y. C.

(ALL THESE COMPANIES CARRY AN AD IN THIS ISSUE)
ALPHABETICAL INDEX PAGES 214-216

Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Co.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Heller Bros. Co., Newark, N. J.
Heppenstall Co., Pittsburgh.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T. & Son, Inc., Chicago.
Timken Roller Bearing Co., Canton, Ohio.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—Alloy, Cold Drawn
Union Drawn Steel Co., Republic Bldg., Youngstown, Ohio.

STEEL—Bright Finished
Union Drawn Steel Co., Republic Bldg., Youngstown, Ohio.

STEEL—Carbon
Andrews Steel Co., The, Newport, Ky.
Carnegie Steel Co., Pittsburgh.
Firth-Sterling Steel Co., McKeesport, Pa.
Latrobe (Pa.) Electric Steel Co.

STEEL—Carbon Vanadium
Andrews Steel Co., The, Newport, Ky.
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome
Andrews Steel Co., The, Newport, Ky.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Youngstown, Ohio.

STEEL—Chrome Manganese
Latrobe (Pa.) Electric Steel Co.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—Chrome Nickel
Andrews Steel Co., Newport, Ky.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Youngstown, Ohio.

STEEL—Chrome Vanadium
Andrews Steel Co., Newport, Ky.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Youngstown, Ohio.

STEEL—Cobalt
Darwin & Milner, Inc., Cleveland.

STEEL—Cold Drawn
Bethlehem (Pa.) Steel Co.
Bills & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Globe Wire Company, Div. of the Firth-Sterling Steel Co., Sharpsburg, Pa.
Latrobe (Pa.) Electric Steel Co.
Pittsburgh Tool Steel Wire Co., Monaca, Pa.
Rathbone, A. B. & J., Palmer, Mass.
Union Drawn Steel Co., Republic Bldg., Youngstown, Ohio.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Cold Rolled Strips
Acme Steel Co., Chicago.
American Tube & Sdg. Plant (The Stanley Wks.), Bridgeport, Conn.
Athenia Steel Co., 135 William St., N. Y.
Cold Metal Process Co., Youngstown, Ohio.
Griffin Mfg. Co., Erie, Pa.
Latrobe (Pa.) Electric Steel Co.
Stanley Works, The, New Britain, Ct.
Superior Steel Corp., Union Trust Bldg., Pgh.
Washburn Wire Co., Inc., 118th St. & Harlem River, N. Y. C.
Weirton (W. Va.) Steel Co.
West Leeburg Steel Co., Pgh.
Wetherell Bros. Co., Cambridge, 39, Mass.
Widewire Spencer Steel Co., 41 E. 42nd, N. Y. C.
Worcester (Mass.) Pressed Steel Co.

STEEL—Crucible
Columbia Tool Steel Co., Chicago Hgts., Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Cutlery
Firth-Sterling Steel Co., McKeesport, Pa.
Latrobe (Pa.) Electric Steel Co.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Die
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company.
Diston, Henry & Sons, Inc., Phila.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., Pittsburgh.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Youngstown, Ohio.

STEEL—Drill
Heller Bros. Co., Newark, N. J.
Latrobe (Pa.) Electric Steel Co.

STEEL—Electric
Bethlehem (Pa.) Steel Co.
Diston, Henry & Sons, Inc., Phila.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Latrobe (Pa.) Electric Steel Co.
Timken Roller Bearing Co., Canton, O.

STEEL—High Speed
Allen, Edgar, Steel Co., Inc., 745 Washington St., N. Y. C.
Bethlehem (Pa.) Steel Co.
Columbia Tool Steel Co., Chicago Hgts., Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Heller Bros. Co., Newark, N. J.

Latrobe (Pa.) Elec. Steel Co.
Ryerson, Jos. T. & Son, Inc., Chicago.
Simonds Saw & Steel Co., Lockport, N. Y.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—Hot Rolled Strips
Acme Steel Co., Chicago.
American Tube & Sdg. Plant (The Stanley Wks.), Bridgeport, Conn.
Barons, Wallace, Co., The, Bristol, Ct.
Griffin Mfg. Co., Erie, Pa.
Latrobe Steel Co., St. Louis, Mo.
Latrobe (Pa.) Elec. Steel Co.
Republic Steel Corp., Youngstown, Ohio.
Stanley Works, The, New Britain, Ct.
Superior Steel Corp., Union Trust Bldg., Pgh.
West Leeburg Steel Co., Pgh.

STEEL—Magnet
Latrobe (Pa.) Elec. Steel Co.
Simonds Saw & Steel Co., Lockport, N. Y.

STEEL—Manganese
Frog Switch & Mfg. Co., The, Carlisle, Pa.

STEEL—Manganese Rolled or Forged
Manganese Steel Forge Co., Phila.

STEEL—Nickel
Andrews Steel Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

STEEL—Open Hearth
Andrews Steel Co., The, Newport, Ky.
Driver-Harris Co., Harrison, N. J.
Jones & Laughlin Steel Corp., Pgh.
Timken Roller Bearing Co., Canton, O.

STEEL—Rustless
Firth-Sterling Steel Co., McKeesport, Pa.
Latrobe (Pa.) Electric Steel Co.

STEEL—Screw
Jones & Laughlin Steel Corp., Pgh.
Timken Roller Bearing Co., Canton, O.
Union Drawn Steel Co., Republic Bldg., Youngstown, Ohio.

STEEL—Special Analysis
Andrews Steel Co., The, Newport, Ky.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Youngstown, Ohio.
Timken Roller Bearing Co., Canton, O.
West Leeburg Steel Co., Pgh.

STEEL—Spring
Athenia Steel Co., 135 William St., N. Y.
Barnes, Wallace, Co., The, Bristol, Ct.
Bethlehem (Pa.) Steel Co.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T. & Son, Inc., Chicago.
Timken Roller Bearing Co., Canton, Ohio.

STEEL—Stainless
Bethlehem (Pa.) Steel Co.
Diston, Henry & Sons, Inc., Philadelphia.
Firth-Sterling Steel Co., McKeesport, Pa.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Youngstown, Ohio.
Simonds Saw & Steel Co., Lockport, N. Y.

STEEL—Tool
Allen, Edgar, Steel Co., Inc., 745 Washington St., N. Y. C.
Bethlehem (Pa.) Steel Co.
Columbia Tool Steel Co., Chicago Hgts., Ill.
Darwin & Milner, Inc., Cleveland.
Diston, Henry & Sons, Inc., Phila.
Firth-Sterling Steel Co., McKeesport, Pa.
Heller Bros. Co., Newark, N. J.
Latrobe (Pa.) Electric Steel Co.
Milne, A. & Co., 745 Washington St., N. Y. C.
Ryerson, Jos. T. & Son, Inc., Chicago.
Simonds Saw & Steel Co., Lockport, N. Y.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wetherell Bros. Co., Cambridge 39, Mass.

STEEL—Tool, Special Shapes
Heller Bros. Co., Newark, N. J.
Latrobe (Pa.) Electric Steel Co.

STEEL—Vanadium
Andrews Steel Co., Newport, Ky.
Latrobe (Pa.) Elec. Steel Co.
Republic Steel Corp., Youngstown, Ohio.

STEEL PLANTS AND ROLLING MILLS
McKee, Arthur G. & Co., Cleve.
Perin & Marshall, 11 West 42nd St., N. Y. C.

STEEL PLATE CONSTRUCTION
Chicago (Ill.) Bridge & Iron Wks.
Cole, R. D., Mfg. Co., Newnan, Ga.
Jones & Laughlin Steel Corp., Pgh.
Lancaster (Pa.) Iron Works, Inc.
Meehan Boiler & Construction Co., Lowellville, Ohio.
Muskegon (Mich.) Boiler Wks.
Petroleum Iron Works Co., Sharon, Pa.
Scalfe, Wm. B. & Sons Co., Pgh.
Traylor Engng. & Mfg. Co., Allentown, Pa.

STEEL ROLLS
Heppenstall Co., Pittsburgh.

STEPS—Ladder & Stair, Safety
Blaw-Knox Co., Pittsburgh.
Central Iron & Steel Co., Harrisburg, Pa.

STEPS—Safety
Hendrick Mfg. Co., Carbondale, Pa.

STOCKS AND DIES

Jones & Lamson Mach. Co., Springfield, Vt.
Saunders', D. Sons, Yonkers, N. Y.

STOKERS

Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

STOPPERS—Open-Hearth, Bessemer or Electric Furnace

McCullough-Dalzell Crucible Co., Pgh.
Ross-Taney Crucible Co., Phila.

STOVES—Hot Blast

Brassett, H. A. & Co., Chicago.
Frey Engineering Co., Chicago.

STRAIGHTENING MACHINES

Actna-Standard Eng. Co., Youngstown, O.
Bills, E. W. Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Kane & Bosch, Syracuse, N. Y.
Newbold, R. S. & Son Co., Norristown, Pa.
Pelt, Henry & Co., 90 West St., N. Y. C.
Thomas Spacing Mch. Co., Pgh., Pa.

STRAIGHTENING MACHINES—Wire
Lewis Mch. Co., The, Cleveland, Ohio.
Shuster, F. B. Co., New Haven, Ct.

STRUCTURAL IRON AND STEEL WORK

Austin Co., The, Cleveland.
Beimont Iron Wks., Phila.
Bethlehem (Pa.) Steel Co.
Morgan Engng. Co., Alliance, O.
Phoenix Iron Co., Phila.
Shoemaker Bridge Co., Pottstown, Pa.

STRUCTURAL STEEL—See Angles, Beams, Channels and Tees

SUPERHEATERS

Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

SWAGING MACHINES

Etna Machine Co., The, Toledo.
Langelier Manufacturing Co., Providence, R. I.
Quickwork Co., The (Not Incorporated—H. Collier Smith, Owner) St. Marys, O.
Standard Machinery Co., Auburn, R. I.
Torrington (Ct.) Co.

SWITCHES—Electric
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

TACHOMETERS—Angular and Linear Velocity

Barbour-Stockwell Co., Cambridge, Mass.

TANKS—Compressed Air, Gas, Oil and Water

Air-Tight Steel Tank Co., Pgh.
Caldwell, W. E. Co., 1940 Brook St., Louisville, Ky.
Kellogg, M. W. Co., The, 225 Edway, N. Y. C.
Muskegon (Mich.) Boiler Wks.
Petroleum Iron Works Co., Sharon, Pa.
Scalfe, Wm. B. & Sons Co., Pgh.
Smith, A. O. Corp., Milwaukee.
Westinghouse Traction Brake Co., Wilmerding, Pa.

TANKS—Elevated Steel

Chicago (Ill.) Bridge & Iron Wks.
Cole, R. D., Mfg. Co., Newnan, Ga.

TANKS—Elevated Wood

Caldwell, W. E. Co., 1940 Brook St., Louisville, Ky.
Hauser-Stander Tank Co., Cincinnati.

TANKS—Gasoline & Oil

Chicago (Ill.) Bridge & Iron Wks.

TANKS—Iron and Steel

Caldwell, W. E. Co., 1940 Brook St., Louisville, Ky.
Chicago (Ill.) Bridge & Iron Wks.
Janney, Joseph A., Jr., Phila.
Kellogg, M. W. Co., The, 225 Edway, N. Y. C.
Lancaster (Pa.) Iron Works, Inc.
Scalfe, Wm. B. & Sons Co., Pgh.

TANKS—Lead Lined

Gross Lead Burning & Coating Corp., Cleveland.
Hauser-Stander Tank Co., Cincinnati.

TANKS—Pickling

Hauser-Stander Tank Co., Cincinnati.
Woodford, G. Wood Tank Mfg. Co., Phila.

TANKS—Rubber Lined

Hauser-Stander Tank Co., Cincinnati.

TANKS—Seamless Steel

National Tube Co., Pittsburgh.

TANKS—Water

Hauser-Stander Tank Co., Cincinnati.

TANKS—Welded

Air-Tight Steel Tank Co., Pgh.
National Tube Co., Pittsburgh.
Scalfe, Wm. B. & Sons Co., Pgh.

TANKS—Wood

Caldwell, W. E. Co., 1940 Brook St., Louisville, Ky.
Hauser-Stander Tank Co., Cincinnati.
Woodford, G. Wood Tank Mfg. Co., Phila.

TAPPING MACHINES

Baker Bros., Inc., Toledo.
Barnes Drill Co., Inc., Rockford, Ill.
Defiance (O.) Machine Works
Langelier Manufacturing Co., Providence, R. I.

TAPPING MACHINES—Nuts

National Mchry. Co., Tiffin, Ohio.

TAPS—Collapsing

Geometric Tool Co., New Haven, Conn.
Murphy Mach. & Tool Co., 951 Porter St., Detroit.
National Acme Co., The, Cleveland.

TAPS AND DIES

Brubaker, W. L. & Bros., Co., 50 Church St., N. Y. C.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Murphy Mach. & Tool Co., 951 Porter St., Detroit.
National Acme Co., The, Cleveland.
Pipe Mchry. Co., Cleveland.

TAR DISTILLING PLANTS

Koppers Construction Co., The, Pgh.

TEES—See Angles, Beams, Channels and Tees

TELEPHONES—Interior

Screw Machine Products Corp., Prov., R. I.

TESTING MACHINES—Materials

Southwark Fdry. & Mch. Co., Phila.

THREAD CUTTING TOOLS—See Dies, Taps, Screw Plates, etc.

THREAD ROLLING MACHINES

Nelson, A. H. Mach. Co., Bridgeport, Ct.
Waterbury (Ct.) Farrel Fdry. & Mch. Co.

THREADING MACHINES

Geometric Tool Co., New Haven, Conn.
National Mchry. Co., Tiffin, Ohio.

TIE PLATES

Inland Steel Co., Chicago.
Joliet (Ill.) Wrought Washer Co.

TIES—Crossed
Century Wood Preserving Co., Pgh.

TIES—Metal
Bethlehem (Pa.) Steel Co.

TILE—Cement Roofing

American Cement Tile Mfg. Co., 903 Oliver Bldg., Pgh.

TIN PLATE

Weirton (W. Va.) Steel Co.

TIN PLATE MACHINERY

Actna-Standard Eng. Co., Youngstown, O.

TINNERS' TOOLS AND MACHINES

Niagara Mch. & Tool Wks., Buffalo, N. Y.
Quickwork Co., The (Not Incorporated—H. Collier Smith, Owner) St. Marys, O.

TONGS—Chain Pipe

Williams, J. H. & Co., Buffalo, N. Y.

TOOL BITS

Apex Tool Co., Inc., Bridgeport, Conn.

TOOL HOLDERS

Apex Tool Co., Inc., Bridgeport, Conn.
Armstrong Bros. Tool Co., Chicago.
Williams, J. H. & Co., Buffalo, N. Y.

TOOLS—Lathe

Armstrong Bros. Tool Co., Chicago.

TOOLS—Steam and Gas Fitters

Saunders', D. Sons, Yonkers, N. Y.

TOOLS—Tungsten Carbide

Firth-Sterling Steel Co., McKeesport, Pa.

TORCHES—Blow

Anthony Co., L. I. C., N. Y.
Hauk Mfg. Co., 128 10th St., Bklyn, N. Y.

TOWERS—Steel

Blaw-Knox Co., Pittsburgh.
Caldwell, W. E. Co., 1940 Brook St., Louisville, Ky.

TOWERS—Transmission

Blaw-Knox Co., Pittsburgh.

TOWERS—Water—See Tanks—Elevated Steel and Elevated Wood

TRACK—Industrial

Bethlehem (Pa.) Steel Co.

TRACK—Monorail

American MonoRail Co., The, Cleveland.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

TRACTORS AND TRAILERS—See Trucks, Tractors and Trailers—Industrial

(ALL THESE COMPANIES CARRY AN AD IN THIS ISSUE)
ALPHABETICAL INDEX PAGES 214-216

TRAILERS—Industrial—See Trucks, Trailers and Trailers—Industrial**TRAMRAILS—Overhead Systems**

Armington Engineering Co., Euclid, O.
Cleveland Electric Tramrail, Wickliffe, O.
Reading (Pa.) Chain & Block Corp.
Shepard Niles Crane & Hoist Corp.,
Montour Falls, N. Y.

TRAMWAYS—Wire Rope

Broderick & Bascom Rope Co., St. Louis.
Leschen, A. & Sons Rope Co., St. Louis.

TRAPS—Steam and Radiator

Johns-Manville Corp., 292 Madison Ave.,
New York City.
Strong, Carlisle & Hammond Co., Cleve.

TROLLEYS

Conco Crane & Eng. Wks. Div. of H. D.
Conkey & Co., 36 So. Jefferson St.,
Mendota, Ill.

Hanna Engineering Works, Chicago.
Robbins & Myers, Inc., Springfield, Ohio.
Shepard Niles Crane & Hoist Corp.,
Montour Falls, N. Y.

TROLLEYS—Monorail

American Monorail Co., The, Cleveland.

TRUCKS—Dump (Power)

Crescent Truck Co., Lebanon, Pa.

TRUCKS—Elevating (Power)

Automatic Transportation Co., Inc., 191
West 87th St., Chicago, Ill.
Baker-Raulang Co., Cleveland, O.
Crescent Truck Co., Lebanon, Pa.
Wright-Hibbard Industrial Elec. Truck
Co., Inc., Phelps, N. Y.

TRUCKS—Lift (Hand and Foot)

Lewis-Shepard Co., 122 Walnut St.,
Watertown Station, Boston.

TRUCKS—Steel Shop

American Pulley Co., Philadelphia

TRUCKS—Two Wheel Hand

American Pulley Co., Philadelphia
Colson Co., The, Elyria, Ohio.

TRUCKS, TRACTORS AND TRAILERS—Industrial

Atlas Car & Mfg. Co., Cleve.
Automatic Transportation Co., Inc., 191
West 87th St., Chicago, Ill.
Baker-Raulang Co., Cleveland, O.
Chase Fdry. & Mfg. Co., Columbus, O.
Colson Co., The, Elyria, Ohio.
Crescent Truck Co., Lebanon, Pa.
Wright-Hibbard Industrial Elec. Truck
Co., Inc., Phelps, N. Y.

TUBE EXPANDERS

Dudgeon, Richard, Inc., 24-26 Columbia
St., New York City.

TUBE FORMING MACHINES

Yoder Co., The, Cleveland.

TUBE MILL MACHINERY

Aetna-Standard Eng. Co., Youngstown, O.
Treadwell Engineering Co., Easton, Pa.
United Engrg. & Fdry. Co., Pgh.

TUBES—Boiler

Babcock & Wilcox Tube Co., 85 Liberty
St., N. Y. C.
Keating, E. F. Co., 452 Water St.,
N. Y. C.

National Tube Co., Pittsburgh.
Pittsburgh (Pa.) Steel Products Co.
Ryerson, Jos. T. & Son, Inc., Chicago.
Spang, Chalfant & Co., Inc., Pittsburgh,
Pa.

Wanderman, H. L. Co., The, 1440
Broadway, New York City.

TUBES—Boiler, Charcoal Iron

Bethlehem (Pa.) Steel Co.
Keating, E. F. Co., 452 Water St., N. Y.
Tyler Tube & Pipe Co., Washington, Pa.

TUBES—Nickel Silver

Summerhill Tubing Co., Bridgeport, Mont-
gomery County, Pa.

TUBING—Aluminum, Seamless

Summerhill Tubing Co., Bridgeport, Mont-
gomery County, Pa.

TUBING—Brass, Bronze, Copper, Monel, Aluminum (Centrifugally Cast)

Paper & Textile Mchry. Co., The, San-
dusky, Ohio.

TUBING—Brass, Bronze, Copper or Nickel Silver

Service Steel Co., Detroit.
Summerhill Tubing Co., Bridgeport, Mont-
gomery County, Pa.
Wolverine Tube Co., Detroit.

TUBING—Chrome Alloy

Delaware Seamless Tube Co., The, Au-
burn, Pa.

TUBING—Cylinder Finish

Delaware Seamless Tube Co., The, Au-
burn, Pa.

TUBING—Phosphor Bronze

Phosphor Bronze Smelting Co., Phila.

TUBING—Seamless Steel

Babcock & Wilcox Tube Co., 85 Liberty
St., N. Y. C.
Cleveland (O.) Tool & Supply Co.
Delaware Seamless Tube Co., The, Au-
burn, Pa.

Jones & Laughlin Steel Corp., Pgh.
Keating, E. F. Co., 452 Water St.,
N. Y. C.

National Tube Co., Pittsburgh.
Pittsburgh (Pa.) Steel Products Co.
Service Steel Co., Detroit.
Spang, Chalfant & Co., Inc., Pittsburgh,
Pa.

Summerhill Tubing Co., Bridgeport, Mont-
gomery County, Pa.

Timken Roller Bearing Co., Canton, Ohio.
Wanderman, H. L. Co., The, 1440
Broadway, New York City.

TUBING—Square and Rectangular

National Tube Co., Pittsburgh.
Service Steel Co., Detroit.
Summerhill Tubing Co., Bridgeport, Mont-
gomery County, Pa.

TUBING—Stainless Iron

Spang, Chalfant & Co., Inc., Pittsburgh,
Pa.

TUBING—Welded Steel

National Tube Co., Pittsburgh.
Service Steel Co., Detroit.
Tyler Tube & Pipe Co., The, Washington,
Pa.

Wanderman, H. L. Co., The, 1440
Broadway, New York City.

TUBING MACHINERY—Brazed

Etna Machine Co., The, Toledo

TUBULAR PRODUCTS

Cleveland (O.) Tool & Supply Co.
Service Steel Co., Detroit.

TUMBLING BARRELS

Baird Machine Co., Bridgeport, Ct.
Globe Mach. & Stpg. Co., Cleveland.
Ranshoff, N. Inc., Cinn., Ohio.
Sly, W. W., Mfg. Co., Cleveland, O.

TURBINES

De Laval Steam Turbine Co., Trenton, N. J.

TURNTABLES

Canton (O.) Fdry. & Mch. Co.

TWIST DRILLS

Cleveland (O.) Twist Drill Co.
Morse Twist Drill & Mch. Co., New Bed-
ford, Mass.
Union Twist Drill Co., Athol, Mass.
Whitman & Barnes, Inc., Detroit, Mich.

TYPE—Steel

Noble & Westbrook Mfg. Co., Hartford,
Ct.

UNIONS

Dart, E. M., Mfg. Co., Prov., R. I.

VALVES—Air Operating

Galland-Henning Mfg. Co., Milwaukee.
Westinghouse Traction Brake Co., Wil-
merding, Pa.

VALVES—Blast Furnace

Frey Engineering Co., Chicago.

VALVES—Gas and Air Reversing

Swindell-Dressler Corp., Box 1753, Pgh.

VALVES—Gas, Water and Steam

Wood, R. D., & Co., Philadelphia.

VALVES—Hydraulic

Anker Engng. Co., Phila.
Bridgman (Pa.) Steel Fdry. & Mch. Co.
Galland-Henning Mfg. Co., Milwaukee.
Southwark Fdry. & Mch. Co., Phila.

Watson-Stillman Co., The, 71 West St.,
N. Y. C.

Wood, R. D., & Co., Philadelphia.

VALVES—(Pressure Seated) Pneumatic

Cleveland (O.) Pneumatic Tool Co., The

VALVES—Machine, Compensating

Arey Drilling Mch. Co., Cincinnati, O.

WASHERS—Bevel

Nicolet Plate Washer Co., Inc., Phila.

WASHERS—Iron or Steel

Bethlehem (Pa.) Steel Co.
Central Iron & Steel Co., Harrisburg, Pa.
Griffin Mfg. Co., Erie, Pa.

Hager, C. & Sons Hinge Mfg. Co., St.
Louis, Mo.

Joliet (Ill.) Wrought Washer Co.
Master Products Co., The, 6420 Park Ave.,
S. E., Cleveland, O.

Nicolet Plate Washer Co., Inc., Phila.
Shakeproof Lock Washer Co., Chicago.
Smith, Thomas, Co., 236 Grove St.,
Worcester, Mass.

Wrought Washer Mfg. Co., Milwaukee.

WASHERS—Leather

Chicago (Ill.) Rawhide Mfg. Co., 1313
Elston Ave.

Graton & Knight Co., Worcester, Mass.

WASHERS—Lock

Shakeproof Lock Washer Co., Chicago.

WASHERS—Special

Shakeproof Lock Washer Co., Chicago.

WASHERS—Spring Steel

Dunbar Bros. Co., Bristol, Ct.

WASHERS—Tempered

Barnes, Wallace Co., The, Bristol, Ct.

WASHING MACHINES—For Metal Parts

Detroit (Mich.) Sheet Metal Wks.
Meier Co., The, Chicago.

Ranshoff, N. Inc., Cinn., Ohio.

WATER-COOLED EQUIPMENT FOR OPEN-HEARTH FURNACES

Blaw-Knox Co., Pittsburgh.

WATER SOFTENERS AND PURIFIERS

Scaife, Wm. B., & Sons Co., Pgh.

WELDING—Electric

Agnew Elec. Welder Co., Milford, Mich.
Blaw-Knox Co., Pittsburgh

Federal Mch. & Welder Co., Warren, O.
Smith, A. O., Corp., Milwaukee

Thomson-Gibb Electric Welding Co., 661
Pleasant St., Lynn, Mass.

WELDING—Forge & Hammer

Blaw-Knox Co., Pittsburgh

WELDING—Oxy-Acetylene

Blaw-Knox Co., Pittsburgh

WELDING AND CUTTING MACHINES AND EQUIPMENT—Oxy-Acetylene

Air Reduction Sales Co., 60 East 42nd
St., N. Y. C.

Imperial Brass Mfg. Co., 1210 W. Harri-
son St., Chicago, Ill.

WELDING MACHINES—Butt

Agnew Elec. Welder Co., Milford, Mich.
Federal Mch. & Welder Co., Warren, O.

Swift Electric Welder Co., Blvd Temple
Bldg., West Grand Blvd. at 12th St.,
Detroit

Taylor-Winfield Corp., The, Warren, O.
Thomson-Gibb Electric Welding Co., 661
Pleasant St., Lynn, Mass.

WELDING MACHINES—(Electric Arc) Second Hand

Goodman Elec. Mchry. Co., Newark, N. J.
Lincoln Electric Co., Cleveland.

WELDING MACHINES—Seam

Federal Mch. & Welder Co., Warren, O.
Taylor-Winfield Corp., The, Warren, O.

WELDING MACHINES—Spot

Agnew Elec. Welder Co., Milford, Mich.
Federal Mch. & Welder Co., Warren, O.

Swift Electric Welder Co., Blvd Temple
Bldg., West Grand Blvd. at 12th St.,
Detroit

Thomson-Gibb Electric Welding Co., 661
Pleasant St., Lynn, Mass.

WELDING MACHINES—(Spot), Second Hand

Taylor-Hall Welding Corp., 5 May St.,
Worcester, Mass.

WHEELS—Caster and Truck

Colson Co., The, Elyria, Ohio.

WHEELS—Rolled Steel

Bethlehem (Pa.) Steel Co.

Carnegie Steel Co., Pittsburgh.

WIRE—Barb

Bethlehem (Pa.) Steel Co.

Jones & Laughlin Steel Corp., Pgh.

WIRE—Brass, Bronze, Copper, Nickel Silver or Phosphor Bronze

Michigan Wire Cloth Co., 2117 Howard
St., Detroit.

Phosphor Bronze Smelting Co., Phila.
Beymour (Ct.) Mfg. Co.

WIRE—Flat, Round, Square or Special Shapes

Page Steel & Wire Co., Bridgeport, Ct.

Prentiss, Geo. W., & Co., Holyoke, Mass.

Roebbing's, John A., Sons Co., Trenton,
N. J.

Washburn Wire Co., Inc., 118th St. &
Harlem River, N. Y. C.

Webb Wire Works, New Brunswick, N. J.
Wickwire Bros., Cortland, N. Y.

Wickwire Spencer Steel Co., 41 E. 42nd,
N. Y. C.

WIRE—Netting

Cleveland (O.) Wire Cloth & Mfg. Co.

Wickwire Brothers, Cortland, N. Y.

WIRE—Plane and Music

Washburn Wire Co., 118th St. & Harlem
River, New York City.

Webb Wire Works, New Brunswick, N. J.
Wickwire Spencer Steel Co., 41 E. 42nd,
N. Y. C.

WIRE—Rubber Covered

Hazard Wire Rope Co., Wilkes-Barre, Pa.

WIRE—Special, Drawn Shapes

Rathbone, A. B. & J., Palmer Mass.

WIRE—Spoke and Crimping

Prentiss, Geo. W., & Co., Holyoke, Mass.

WIRE—Spring Steel

Barnes, Wallace Co., The, Bristol, Ct.

Bethlehem (Pa.) Steel Co.

Johnson Steel & Wire Co., Inc., Wor-
cester, Mass.

Jones & Laughlin Steel Corp., Pittsburgh

Wickwire Spencer Steel Co., 41 E. 42nd
St., N. Y. C.

WIRE—Steel

Johnson Steel & Wire Co., Inc., Wor-
cester, Mass.

Wheeling (W. Va.) Steel Corp.

WIRE—Welding

Lincoln Electric Co., Cleveland.

Roebbing's, John A., Sons Co., Trenton,
N. J.

Ryerson, Jos. T. & Son, Inc., Chicago

Wickwire Spencer Steel Co., 41 E. 42nd
St., N. Y. C.

WIRE CLOTH

Buffalo (N. Y.) Wire Works Co., Inc.

Cleveland (O.) Wire Cloth & Mfg. Co.

Michigan Wire Cloth Co., 2117 Howard
St., Detroit, Mich.

Wickwire Bros., Cortland, N. Y.

Wickwire Spencer Steel Co., 41 E. 42nd
St., N. Y. C.

WIRE COILING AND SPIRALLING MACHINERY

Hoagland's, M., Sons Co., Stockaway, N. J.

Sleeper & Hartley, Inc., Worcester, Mass.

Vaughn Mchry. Co., Cuyahoga Falls, O.

Waterbury (Ct.) Farrel Fdry. & Mch. Co.

WIRE FORMING

Amer. Spiral Spring & Mfg. Co., Pgh.

American Spring & Mfg. Corp., Holley,
Mich.

Buffalo (N. Y.) Wire Works Co., Inc.

Cleveland (O.) Wire Spring Co.

Cuyahoga Spring Co., Cleveland

Fischer, Chas., Spring Co., 242 Kent
Ave., Brooklyn, N. Y.

Hindley Mfg. Co., Valley Falls, R. I.

Lee Spring Co., Inc., 39 Main St., Bk-
lyn, N. Y.

Titchener, E. H., & Co., Binghamton,
N. Y.

Wickwire Bros., Cortland, N. Y.

WIRE FORMING MACHINERY

Manville, E. J., Mach. Co., Waterbury, Ct.

Nilson, A. H., Mach. Co., Bridgeport, Ct.

Sleeper & Hartley, Inc., Worcester, Mass.

Wickwire Spencer Steel Co., 41 E. 42nd
St., N. Y. C.

WIRE MILL MACHINERY AND EQUIPMENT

Rhuster, F. B. Co., New Haven, Ct.

Sleeper & Hartley, Inc., Worcester, Mass.

Vaughn Mchry. Co., Cuyahoga Falls, O.

Wickwire Spencer Steel Co., 41 E. 42nd
St., N. Y. C.

WIRE NAIL MACHINERY

National Mchry. Co., Tiffin, Ohio.

Ryerson, Jos. T. & Son, Inc., Chicago

Sleeper & Hartley, Inc., Worcester, Mass.

Wickwire Spencer Steel Co., 41 E. 42nd
St., N. Y. C.

WIRE ROPE

Broderick & Bascom Rope Co., St. Louis.

Advertisers Index

A

Abtort Ball Co. 101
 Abendroth & Root Mfg. Co. 130
 Abrasive Mch. Tool Co. 57
 Acme Machinery Co. 61
 Acme Stpg. & Mfg. Co. 197
 Acme Steel Co. 129
 Adriance Mach. Works, Inc. 71
 Aetna-Standard Eng. Co. 101
 Agnew Electric Welder Co. 82
 Air Reduction Sales Co. 79
 Air-Tight Steel Tank Co. 120
 Akron Gear & Engng. Co. 108
 Akron-Selle Co., The. 150
 Alan Wood Steel Co. 135, 187
 Albert & Davidson Pipe Corp. 195
 Albert Pipe Supply Co., Inc. 195
 Allen, Edgar, Steel Co., Inc. 126
 Allen, John F., Co. 78
 Allen Mfg. Co., The. 157
 Alliance Machine Co., The. 90
 Allis-Chalmers Mfg. Co. 178
 American Broach & Mach. Co. 56
 American Cement Tile Mfg. Co. 121
 American Chemical Paint Co. 172
 American Crane Co., Inc. 90
 American Crusher & Machinery Corp. 188
 American Electric Furnace Co. 176
 American Engineering Co. 93
 American Fluid Motors Co. 73
 American Gas Furnace Co. 176
 American Manganese Bronze Co. 147
 American Manganese Steel Co. 143
 American MonoRail Co., The. 92
 American Pipe Bending Mch. Co. 78
 American Pressed Steel Co. 186
 American Pulver Co. 147
 American Pulverizer Co. 188
 American Roller Bearing Co. 155
 American Spiral Spring & Mfg. Co. 170
 American Spring & Mfg. Corp. 170
 American Steel Foundries. 143, 144
 American-Terry-Derrick Co. 93
 American Tool Works Co. 54
 Ames, W., & Co. 159
 Ams, Max, Mch. Co., The. 196
 Andes, Inc. 198
 Andrews Steel Co. 121
 Anker Engineering Co. 179
 Anthony Co. 176
 Apex Tool Co., Inc. 66
 Arcade Mfg. Co. 98
 Archer & Baldwin, Inc. 193
 Armel, James P. 194
 Armstrong Engrg. Co. 88
 Armstrong-Blum Mfg. Co. 60
 Armstrong Bros. Tool Co. 52
 Athena Steel Co., The. 126
 Atkins, E. C., & Co. 64
 Atlas Brass Fdry. Co. 198
 Atlas Car & Mfg. Co. 98
 Atlas Drop Forge Co. 141
 Atlas Steel Casting Co. 143
 Auburn Ball Bearing Co. 156
 Austin Co., The. 120
 Automatic Transportation Co., Inc. 97
 Avey Drilling Mch. Co. 54, 60

B

Babcock & Wilcox Co., The. 133
 Baird Machine Co. 99

C

Baker Bros., Inc. 54
 Baker, J. E., Co. 133
 Baker-Raulang Co. 24
 Bantam Ball Bearing Co. 156
 Barber-Colman Co. 60
 Barbour-Stockwell Co. 118
 Bardons & Oliver. 58
 Barnes Drill Co., Inc. 46
 Barnes-Gibson-Raymond, Inc. 20
 Barnes, Wallace, Co., The. 20
 Barnes, W. F., & John, Co. 54
 Bartlett, C. O., & Snow Co. 98
 Bascom & Co. 198
 Bay City Forge Co. 140
 Beardsley & Piper Co. 188
 Beardsley & Wolcott Mfg. Co. 197
 Beatty Mch. & Mfg. Co. 74
 Bedford Fdry. & Mch. Co. 83
 Behringer, E., Sheet Metal Wks., Inc. 197
 Beiden Machine Co. 143
 Bell, David, Co., Inc., The. 159
 Bellevue Industrial Furnace Co. 177
 Belmont Iron Works. 121
 Belyea Co., Inc. 194
 Berger, L. D., Co. 197
 Bernard Service. 201
 Bertsch & Co. 73
 Best, W. N., Corp. 172
 Bethlehem Steel Co. 25
 Bignall & Keeler Mach. Works. 59
 Birdslorn Steel Fdry. & Mch. Co. 72
 Birmingham Grinding Wks. 199
 Bixby, R. W., Inc. 201
 Black & Decker Mfg. Co., The. 57
 Blanchard Mach. Co., The. 57
 Blaw-Knox Co. 104
 Bliss, E. W., Co. 102
 Bliss & Laughlin, Inc. 121
 Booth Felt Co., Inc., The. 179
 Bossert Corp. 149
 Boston Gear Works Sales Co. 110
 Box Crane & Hoist Corp. 89
 Boyle, John, Jr. 200
 Brassert, H. A., & Co. 121
 Breese Bros. Co. 150
 Bridgeport Brass Co. 150
 Bridgeport Safety Emery Wheel Co., Inc., The. 58
 Bristol Co., The. 177
 Broderick & Bascom Rope Co. 168
 Brown & Sharpe Mfg. Co. 30
 Brownell Mchry. Co. 192
 Browning Crane Co., The. 93
 Browning, Victor R., Co., Inc. 88
 Brubaker, W. L., & Bros. Co. 62
 Buckeye Brass & Mfg. Co. 153
 Budd-Ranney Engng. Co., The. 82
 Buffalo Bolt Co. 159
 Buffalo Bronze Die Cast Corp. 198
 Buffalo Forge Co. 103
 Buffalo Scale Co. 88
 Buffalo Wire Wks. Co., Inc. 164
 Bullard Co., The. 45
 Bunting Brass & Bronze Co. 22
 Burgess-Norton Mfg. Co. 197
 Bury Compressor Co. 179
 Business Opportunities Section. 199-200

Caldwell, H. W., & Son Co. 4
 Caldwell, W. E., Co. 118
 Calumet Electric Casteel Co. 144
 Cann & Saul Steel Co. 140
 Canton Forge & Axle Co. 141
 Canton Fdry. & Mch. Co. 92
 Cape May Sand Co. 100
 Carborundum Co. 50
 Carnegie Steel Co. 187
 Cattie, Joseph P., & Bros. 199
 Cavagnaro, John J. 196
 Central Iron & Steel Co. 187
 Century Electric Co. 116
 Century Wood Preserving Co. 187
 Chambersburg Engng. Co. 118
 Champion Blower & Forge Co. 172
 Champion Sheet Metal Co., Inc. 147
 Chase Fdry. & Mfg. Co. 96
 Chateaugay Ore & Iron Co. 137
 Chicago Bridge & Iron Wks. 118
 Chicago Perforating Co. 153
 Chicago Rawhide Mfg. Co. 108
 Cincinnati Bickford Tool Co. 46
 Cincinnati Electrical Tool Co., The. 57
 Cincinnati Lathe & Tool Co. 54
 Cincinnati Shaper Co. 26
 Cincinnati Steel Castings Co. 143
 Clapp, E. D., Mfg. Co., The. 141
 Clark Bros. Bolt Co. 159
 Clark Controller Co. 115
 Clearing House Section. 190-195
 Cleveland Cap Screw Co. 156
 Cleveland-Cliffs Iron Co. 135
 Cleveland Crane & Engng. Co. 88
 Cleveland Electric Tramrail. 88
 Cleveland Hardware Co. 142
 Cleveland Planer Co. 49
 Cleveland Pneumatic Tool Co., The. 66
 Cleveland Punch & Shear Wks. Co. 16
 Cleveland Quarries Co. 57
 Cleveland Tool & Supply Co. 133
 Cleveland Twist Drill Co. 60
 Cleveland Wire Cloth & Mfg. Co. 164
 Cleveland Wire Spring Co. 168
 Cleveland Worm & Gear Co. 108
 Clifton Mchry. Co. 193
 Cochrane-Bly Co. 58
 Cohen, Louis, & Son. 195
 Cold Finished Steel Bar Industry. 127
 Cold Metal Process Co., The. 130
 Cole, R. D., Mfg. Co. 120
 Colson Co., The. 96
 Columbia Tool Steel Co. 126
 Commercial Steel Casting Co., The. 145
 Concor Crane & Engng. Wks., Div. of H. D. Conkey & Co. 88
 Cone Automatic Mach. Co., Inc. 54
 Connecticut Fdry. Co., The. 198
 Consolidated Mach. Tool Corp. of America. 47
 Continental Felt Co. 179
 Continental Iron & Steel Co. 195
 Contract Work Section. 196-199
 Cook, Asa S., Co. 84
 Cook, H. C., Co. 196
 Cook Spring Div. of Barnes-Gibson-Raymond, Inc. 20
 Corbin Screw Corp. 158
 Cowdrey, C. H., Mach. Co. 196
 Crescent Truck Co. 98
 Crucible Steel Casting Co., Ohio. 143
 Crucible Steel Castings Co., Pa. 143
 Cumberland Steel Co. 126
 Curtis & Curtis Co. 58

D

Cutler-Hammer, Inc. 117
 Cuyahoga Spring Co. 168
 Dake Engine Co. 178
 Dart, E. M., Mfg. Co. 188
 Darwin & Milner, Inc. 128
 Davis Brake Beam Co. 197
 DeLancey Machine Works. 56
 De Laval Steam Turbine Co. 178
 Delaware Seamless Tube Co. 133
 Delta Equipment Co. 191
 Densite Corp. of America. 31
 Detroit Electric Furnace Co. 176
 Detroit Hoist & Mach. Co. 93
 Detroit Metal Specialty Corp. 147
 Detroit Sheet Metal Works. 187
 Dickinson, Thos. L. 64
 Dings Magnetic Separator Co. 100
 Disston, Henry, & Sons, Inc. 64
 Divine Bros. Co. 64
 Doelger & Kirsten. 73
 Donahue Steel Prods. Co., Inc. 193
 Dony, D. E. 192
 Dreis & Krump Mfg. Co. 74
 Driver-Harris Co. 122
 Drying Systems, Inc. 177
 Dudgeon, Richard, Inc. 72
 Duff Patents Co., Inc. 120
 Duluth Iron & Metal Co. 195
 Dunbar Bros. Co. 19
 Dundore Mfg. Co. 108
 Duquesne Steel Fdry. Co. 143

E

Earle Gear & Mach. Co. 108
 Eastern Machine Screw Corp. 64
 Eastern Mchry. Co. 191
 Eastern Rolling Mill Co., The. 128
 Eastern Tool & Stpg. Co., Inc. 197
 Economy Engng. Co., The. 58
 Economy Furnace Co. 176
 Edge Hill Silica Rock Co. 137
 Edgewater Steel Co. 140
 Electric Boat Co. 198
 Electric Controller & Mfg. Co. 92
 Electric Furnace Co. 176
 Electro Metallurgical Sales Co. 139
 Elmes, Chas. F., Engng. Wks. 73
 Empire Steel Corp. 12-13
 Employment Exchange. 201-202
 Erdle Perforating Co. 153
 Erie Bronze Co. 146
 Erie Forge Co. 142
 Erie Steel Construction Co. 194, 195
 Espen-Lucas Mach. Works, The. 58
 Essley, E. L., Mchry. Co. 192
 Etna Machine Co., The. 86
 Euclid Crane & Hoist Co., The. 88
 Evans Friction Cone Co. 106
 Excelsior Tool & Mch. Co. 74
 Eyster, Weiser Co. 198

F

Fabricated Steel Prods. Co. 196
 Falk Corp., The. 111-112
 Farrell Mchry. Co. 193
 Federal Mch. & Welder Co. 81
 Felters Co., Inc., The. 179

Advertisers Index

Ferguson Gear Co.....108
 Ferracute Machine Co..... 68
 Firth-Sterling Steel Co.....128
 Fischer, Charles, Spring Co.....170
 Flinn & Dreifein Co..... 17
 Foote Bros. Gear & Mch. Co.....109
 Ford, J. B. Co., The.....172
 Forest City-Walworth Run
 Fdries. Co.146
 Foster, Frank B.....193
 Foster, L. B. Co.....195
 Frank, M. K.....195
 Franklin Mfg. Co..... 84
 Fredericksen Co.154
 French Oil Mill Mchry. Co..... 72
 Freyn Engineering Co..... 32
 Frog Switch & Mfg. Co., The.....143
 Froment & Co.....193

G

Galland-Henning Mfg. Co.....183
 Gardner Machine Co..... 57
 Gehrich Oven Co., Inc.....177
 General Drop Forge Co.....143
 General Electric Vapor Lamp
 Co.48
 General Machine Works.....196
 General Mch. & Mfg. Co.....197
 General Mchry. Corp.....192
 General Refractories Co.....138
 Geometric Tool Co., The..... 62
 Geuder, Paeschke & Frey Co.....148
 Gibson, Wm. D., Co..... 20
 Globe Mch. & Stpg. Co.....150
 Globe Wire Co.....128
 Goodman Electric Mchry. Co.....194
 Gould & Eberhardt..... 57
 Grant Gear Works.....108
 Graton & Knight Co.....220
 Gray, G. A., Co..... 57
 Great Lakes Pressed Steel Corp.....197
 Greenpoint Iron & Pipe Co., Inc.....195
 Griffin Mfg. Co.....130
 Gross Lead Burning & Coating
 Corp.119

H

Hagan, George J., Co.....176
 Hager, C., & Sons Hinge Mfg.
 Co.153
 Hanna Engr. Works.....78, 93
 Hanna Furnace Corp., The.....135
 Harbison-Walker Refractories
 Co.137
 Harnischfeger Corp.88, 92
 Harrington & King Perforating
 Co.152
 Harrington Co., The..... 93
 Harrison, H. H., Inc.....201
 Harsch, John, Bronze & Fdry.
 Co., The.....144
 Hartford Machine Screw Co.....198
 Hartford Special Mchry. Co.,
 The.....108, 196
 Hassall, John, Inc.....199
 Hauck Mfg. Co.....176
 Hauser-Stander Tank Co.....119
 Hayward Co., The..... 87
 Hazard Wire Rope Co.....169
 Hegeler Zinc Co.....133
 Heller Bros. Co.....126
 Helwig Mfg. Co..... 67
 Hendley & Whittemore Co..... 74
 Hendrick Mfg. Co.....153, 184

Heppenstall Co.142
 Herman Pneumatic Mch. Co..... 98
 Hevi Duty Electric Co.....176
 Highway Truck Parts Co.....193
 Hill, Clarke & Co. of Chicago.....190
 Hill Clutch Mch. & Fdry. Co.,
 The.....196

Hill, N. N., Brass Co., The.....197
 Hillman Coal & Coke Co.....136
 Hindley Gear Co.....108
 Hindley Mfg. Co.....168
 Hoagland's, M. Sons Co.....105
 Hoggson & Pettis Mfg. Co., The.....186
 Holcroft & Co.....176
 Horsburgh & Scott Co.....114
 Hoskins Mfg. Co.....217
 Hubbard, M. D., Spring Co.....168
 Hudson Pipe & Supply Co.....195
 Huebel Mfg. Co., Inc.....197
 Hunter Pressed Steel Co.....168
 Hunter Saw & Mch. Co..... 64
 Huribut Rogers Mchry. Co.,
 The..... 58
 Hyde Park Fdry. & Mch. Co.....106
 Hyman, Joseph, & Sons.....191
 Hyman-Michaels Co.....194
 Hyro Mfg. Co.....173

I

Ideal Mchry. Co.....191
 Illinois Steel Warehouse Co.....122
 Independent Pneumatic Tool Co. 66
 Indianapolis Drop Forging Co.....142
 Industrial Brownhoist Corp..... 23
 Industrial Silica Corp..... 98
 Industrial Steel Casting Co..... 31
 Inland Steel Co..... 37
 International Nickel Co., The.....134

J

Janney, Joseph A., Jr.....119
 Jefferson Electric Co..... 5
 Jennison-Wright Co., The.....187
 Johns-Manville Corp.185
 Johnson, Wm. C., & Sons Mchry.
 Co.193
 Johnson Steel & Wire Co., Inc.....164
 Joliet Wrought Washer Co.....164
 Jones & Lamson Mach. Co..... 54
 Jones & Laughlin Steel Corp..... 18
 Jones, W. A., Fdry. & Mch. Co.....113

K

Kane & Roach..... 74
 Kardong Bros., Inc..... 78
 Kearney & Trecker Corp..... 56
 Keating, E. F., Co.....133
 Kelker Blower Co., Inc.....197
 Keller Mechanical Engng. Corp. 58
 Kellogg, M. W., Co., The.....119
 Kennedy, Julian120
 Keystone Forging Co.....142
 Kilborn & Bishop Co., The.....142
 Kingsbury Mach. Tool Corp..... 46
 Kinnear Mfg. Co.....189
 Kline Hardware Co.....198

Konigslow, Otto, Mfg. Co., The.....147
 Koppers Construction Co..... 2

L

L. & D. Pipe Supply Co., Inc.....195
 Laclede Steel Co.....130
 Lake Erie Engineering Corp..... 72
 Lakeside Bridge & Steel Co..... 92
 Lambert & Todd Machine Co.....196
 Lancaster Iron Works, Inc.....119
 Landis Tool Co.55
 Langelier Mfg. Co.85
 Lansing Stamping Co.....147
 Lapointe Mach. Tool Co..... 56
 Latrobe Elec. Steel Co.....121
 Laughlin, Alex., & Co.....121
 Lavino, E. J., & Co.....137
 LeBlond, R. K., Mch. Tool Co. 54
 Lee Spring Co., Inc.....168
 Leland Electric Co.....118
 Leland-Gifford Co.46
 Leschen, A., & Sons Rope Co.....168
 Lewis Fdry. & Mch. Co.....106
 Lewis Mch. Co., The..... 84
 Lewis-Shepard Co.96
 Lincoln Electric Co..... 80
 Littell, F. J., Mch. Co.67
 Llewellyn, Thomas J., & Co.....120
 Lodge & Shipley Mch. Tool Co.....192
 Logansport Mch. Co., The..... 66
 Long & Allstatter Co..... 68
 Lucas Mach. Tool Co..... 56
 Luers Bros. Mchry. & Tool Co.....198
 Lumen Bearing Co.....147
 Lummis & Co.....193

M

McAlier Mfg. Co.171
 MacCabe, T. B.....194
 McClintic-Marshall Co.120
 McCullough-Dalzell Crucible Co.....101
 McKee, Arthur G., & Co.....121
 Machinery Forging Co., The.....142
 Magnetic Mfg. Co.100
 Malleable Iron Fittings Co.....146
 Mallory Mchry. Corp.....195
 Manganese Steel Forge Co.....121
 Manistee Iron Works Co.....179
 Manning, Maxwell & Moore, Inc. 88
 Manville, E. J., Machine Co. 82
 Marchant, Geo. F., Co..... 67
 Maris Bros., Inc..... 90
 Marr-Galbreath Mchry. Co.....192
 Marquette Tool & Mfg. Co.....69-70
 Master Products Co., The.....162
 Maynard Elec. Steel Casting Co.....143
 Meaker Co., The..... 51
 Meehan Boiler & Const. Co.....120
 Meeker Fdry. Co.....144
 Merrell Mfg. Co..... 58
 Metal Specialty Co., The.....147
 Michigan Wire Cloth Co.....164
 Miles Machinery Co.....191
 Miller & Van Winkle, Inc.....170
 Milne, A., & Co.....128
 Milwaukee Elec. Crane & Hoist
 Corp.86
 Milwaukee Forge & Mch. Co.....140
 Minster Machine Co., The..... 68
 Moloch Fdry. & Mch. Co.....118
 Monarch Mch. Tool Co., The.. 54
 Monarch Mchry. Co.....192
 Morey & Co., Inc.....191

Morgan Engineering Co., The.. 91
 Morris Machine Works179
 Morrison Railway Supply Corp.....195
 Morse Twist Drill & Mch. Co. 63
 Motor Repair & Mfg. Co.....194
 Mott Sand Blast Mfg. Co., Inc.....101
 Mullins Mfg. Corp.....147
 Mundt, Chas., & Sons.....152
 Murchey Mch. & Tool Co..... 64
 Muskegon Boiler Wks.....119
 Myers, F. E. & Bro. Co.....179

N

National Acme Co., The.....158
 National Alloy Steel Co.....143
 National Engineering Co.....100
 National Forge & Ordnance Co.....137
 National Mchry. Co.....118
 National Roll & Fdry. Co.....101
 National Tube Co.131
 Nazel Engng. & Mch. Works.....118
 Neely Nut & Bolt Co.....162
 New Albany Mch. Mfg. Co..... 67
 New Departure Mfg. Co..... 42
 New England Pressed Steel Co.....147
 N. Y. Belting & Packing Co.....106
 Newark Malleable Iron Works.....144
 Newbold, R. S., & Son Co..... 73
 Newport Rolling Mill Co.....128
 Newton Die Casting Corp..... 8
 Newton Mfg. Co.....198
 Newton Steel Co.....128
 Niagara Mach. & Tool Works.. 68
 Nicetown Plate Washer Co., Inc.....164
 Nicholls, W. H., Co., Inc..... 98
 Nilson, A. H., Mach. Co..... 83
 Noble & Westbrook Mfg. Co.....186
 Noble Mchry. Co., Inc.....192
 North Wales Machine Co., Inc.....198
 Northern Engineering Works... 94
 Northern Malleable Iron Co.....146
 Norton Co.65

O

Oakite Products Co., Inc..... 53
 O'Brien Mchry. Co., Inc.....192, 194
 Ohio Electric Mfg. Co..... 92
 Ohio Locomotive Crane Co..... 92
 Ohl, George A., & Co., Inc..... 76
 Oliver Iron & Steel Corp.....160-161
 Olson Mfg. Co.156
 Orton Crane & Shovel Co..... 92
 Osborne & Sexton Mchry. Co.....192
 Ottemiller, Wm. H., Co., Inc.....159
 Oviatt, D. C. & Co.....193
 Owen Bucket Co., The..... 86

P

Page Steel & Wire Co.....164
 Pangborn Corporation100
 Paper & Textile Machy. Co.,
 The.....132
 Parish Pressed Steel Co.....151
 Parkersburg Rig & Reel Co.,
 Inc.199
 Patch-Wegner Co., Inc..... 98
 Patent Specialty Supply Co., Inc.....197
 Paul, W. P., Co.....199

Advertisers Index

Payne, N. B., & Co.194
Peerless Mch. Co.60
Pels, Henry, & Co., Inc.73
Penn Fdry. & Mfg. Co.198
Penn, Jacob, Inc.201
Penn Jersey Metal Prods. Corp.197
Penn Screw & Mch. Works.198
Penn Seaboard Corp.199
Pennsylvania Car Co.197
Pennsylvania Engng. Wks.121
Pennsylvania Pump & Compress-
sor Co.179
Peoria Malleable Castings Co.144
Perin & Marshall.121
Perry, Buxton, Doane Co., The.195
Personnel Extension Bureau.201
Petroleum Iron Works Co.119
Philadelphia Gear Works.108
Philadelphia Hardware & Malle-
able Iron Works, Inc.159
Philadelphia Steel & Iron Co.142
Phoenix Iron Co.126
Phosphor Bronze Smelting Co.3
Pickands, Mather & Co.136
Pilling & Co., Inc.135
Pipe Machinery Co.58
Pittsburgh Elec. Furnace Corp.176
Pittsburgh Forge & Iron Co.128
Pittsburgh Metallurgical Co., Inc.137
Pittsburgh Steel Prods. Co.36
Pittsburgh Tool Steel Wire Co.128
Platt Bros. & Co., The.133
Plume & Atwood Mfg. Co.162
Plymouth Locomotive Works.96
Poole Engng. & Mach. Co.106
Portable Machinery Co.86
Potts, Henry, & Co.196
Prentiss, Geo. W., & Co.164
Pressed & Welded Steel Prods.
Co.197
Production Machine Co.57
Progressive Mfg. Co.156

Q

Quickwork Co., The (Not Incor-
porated—H. Collier Smith,
owner)74

R

Racine Tool & Mch. Co.58
Randle Mchry. Co.194
Ransohoff, N., Inc.100
Rathbone, A. B. & J.158
Raymond Mfg. Co.20
Reading Chain & Block Corp.92
Reed-Prentice Corp.46
Reed & Prince Mfg. Co.157
Reliance Machinery Sales Co.192
Republic Steel Corp.9
Research Corp.124
Rhoades, R. W., Metaline Co.,
Inc.153
Rhode Island Tool Co.162
Richards, I. P., Co.67
Richmond Forgings Corp.193
Richmond Malleable Castings Co.146
Ridgway, Craig, & Son Co.86
Rivett Lathe & Grinder Corp.66
Robbins & Myers, Inc.92
Robertson, John, Co., Inc.73
Rockford Drop Forge Co.141
Rockford Iron Wks.72
Rockwell, W. S., Co.176
Roehling's, J. A., Sons Co.165-166

S

Roeper Crane & Hoist Works,
Inc.93
Rogers Brown & Crocker Bros.,
Inc.137
Rollway Bearing Co., Inc.156
Ross Power Equip. Co.194
Ross-Tacony Crucible Co.101
Royersford Fdry. & Mch. Co.,
Inc.198
Russell, Burdall & Ward Bolt
& Nut Co.27
Russell Mch. Co.192
Ryerson, Jos. T., & Son, Inc.40

Safety Grinding Wheel & Mach.
Co.64

St. Paul Corrugating Co.197
Samuel, Frank, & Co.137
Saunders, D., Sons, Inc.58
Scaife, Wm. B., & Sons Co.119
Schatz Mfg. Co., The.77
Schoonmaker, A. G. & Sons, Inc.193
Schwerdtle Stamp Co., The.186
Screw Machine Products Corp.158
Seullin Steel Co.122
Scully-Jones & Co.194
Seifreut-Elstad Mchry. Co.191
Sellers, Wm., & Co., Inc.38
Semet-Solvay Co.10
Seneca Iron & Steel Co.128
Service Steel Co.133
Sessions Foundry Co., The.146
Seymour Mfg. Co., The.135
Seymour Products Co., The.147
Shakeproof Lock Washer Co.163
Shenango-Penn Mold Co.156
Shepard Niles Crane & Hoist
Corp.95
Sherwood, E. C.195
Shimer, Samuel J., & Sons, Inc.158
Shoemaker Bridge Co.120
Shore Instrument & Mfg. Co.,
Inc.178
Shuster, F. B., Co., The.84
Simmons Mch. Tool Corp.190
Simonds Saw & Steel Co.126
Sleeper & Hartley, Inc.84
Sly, W. W., Mfg. Co.100
Smith, A. O. Corp.14-15
Smith, David H., & Sons, Inc.74
Smith, F. P., & Co.164
Smith, Geo. H., Steel Casting Co.144
Smith, H. A., Mchry. Co.192
Smith & Mills Co., The.57
Smith, Thomas, Co.147
Southwark Fdry. & Mch. Co.72
Spang, Chalfant & Co., Inc.21
Spencer, I. S., Sons, Inc.146
Springfield Mfg. Co., The.57
Stacey Engineering Co., The.100
Standard Appraisal Co.200
Standard Electrical Tool Co.57
Standard Machinery Co.86
Standard Pressed Steel Co.156, 198
Stanley Wks., The.197
Sterling Grinding Wheel Co.57
Stevens, Arthur L., Corp.120
Stolper Steel Prods. Corp.200
Storms Drop Forging Co.142
Stowe-Fuller Refractories Co.,
The.137

T

Tannewitz Works, The.66
Taylor & Fenn Co., The.57
Taylor Forge & Pipe Wks.130, 196
Taylor-Hall Welding Corp.193
Taylor-Wilson Mfg. Co.106
Taylor-Winfield Corp., The.82
Tennessee Coal, Iron & Railroad
Co.123
Thomas Spacing Mach. Co.75
Thompson Grinder Co.57
Thomson-Gibb Electric Welding
Co.82
Tinken Roller Bearing Co.219
Titanium Alloy Mfg. Co.218
Titchener, E. H., & Co.167
Toledo Machine & Tool Co.67
Tomkins-Johnson Co.60
Torrington Co.84
Traylor Engng. & Mfg. Co.120
Treadwell Engineering Co.143
Turner & Seymour Mfg. Co.198
Twin Disc Clutch Co.107
Tyler Tube & Pipe Co.133

U

Union Drawn Steel Co.125
Union Mfg. Co.96
Union Steel Casting Co.101
Union Switch & Signal Co.141
Union Twist Drill Co.60
United Engng. & Fdry. Co.34-35
U. S. Body & Forging Co., Inc.143
Universal Boring Mach. Co.56

V

V & O Press Co., The.72
Valley Mould & Iron Corp.122
Vanadium-Alloys Steel Co.11
Vanadium Corp. of America.6
Vaughn Machinery Co., The.101
Veeder-Root, Inc.178
Vermilion Malleable Iron Co.146

W

Wachs-Gregg & Co.192
Walsh, J. T.194

Walter-Wallingford & Co.137
Wanderman, H. L., Co.130
Warner & Swasey Co.44
Washburn Wire Co., N. Y.167
Waterbury-Farrel Fdry. & Mch.
Co.83
Watson-Stillman Co.72, 196
Webb Wire Works, The.164
Weirton Steel Co.128
West Leechburg Steel Co.130
West Penn Mchry. Co.193
West Steel Casting Co., The.144
Western Screw Products Co.158
Western Wire Prods. Co.164
Westfield Nut Co.159
Westinghouse Traction Brake Co.180
Wetherell Bros. Co.126
We Want to Buy Section.196
Wetmore, James A.200
Wheeling Steel Corp.121
Wheelock, Lovejoy & Co., Inc.1
White, A. D., Mchry. Co.193
Whitman & Barnes, Inc.7
Whitney Mfg. Co., The.106
Whiton, D. E., Mach. Co.66
Wickwire Bros.167
Wickwire Spencer Steel Co.39
Wilcox, D., Mfg. Co.142
Williams, J. H., & Co.141
Wilson-Maculen Co., Inc.178
Wolverine Tube Co.133
Wood, R. D. & Co.182
Woodford, G. Wood Tank Mfg.
Co.118
Worcester Pressed Steel Co.197
Worcester Stamped Metal Co.150
Wright-Hibbard Industrial Elec-
tric Truck Co., Inc.96
Wrought Washer Mfg. Co.162

Y

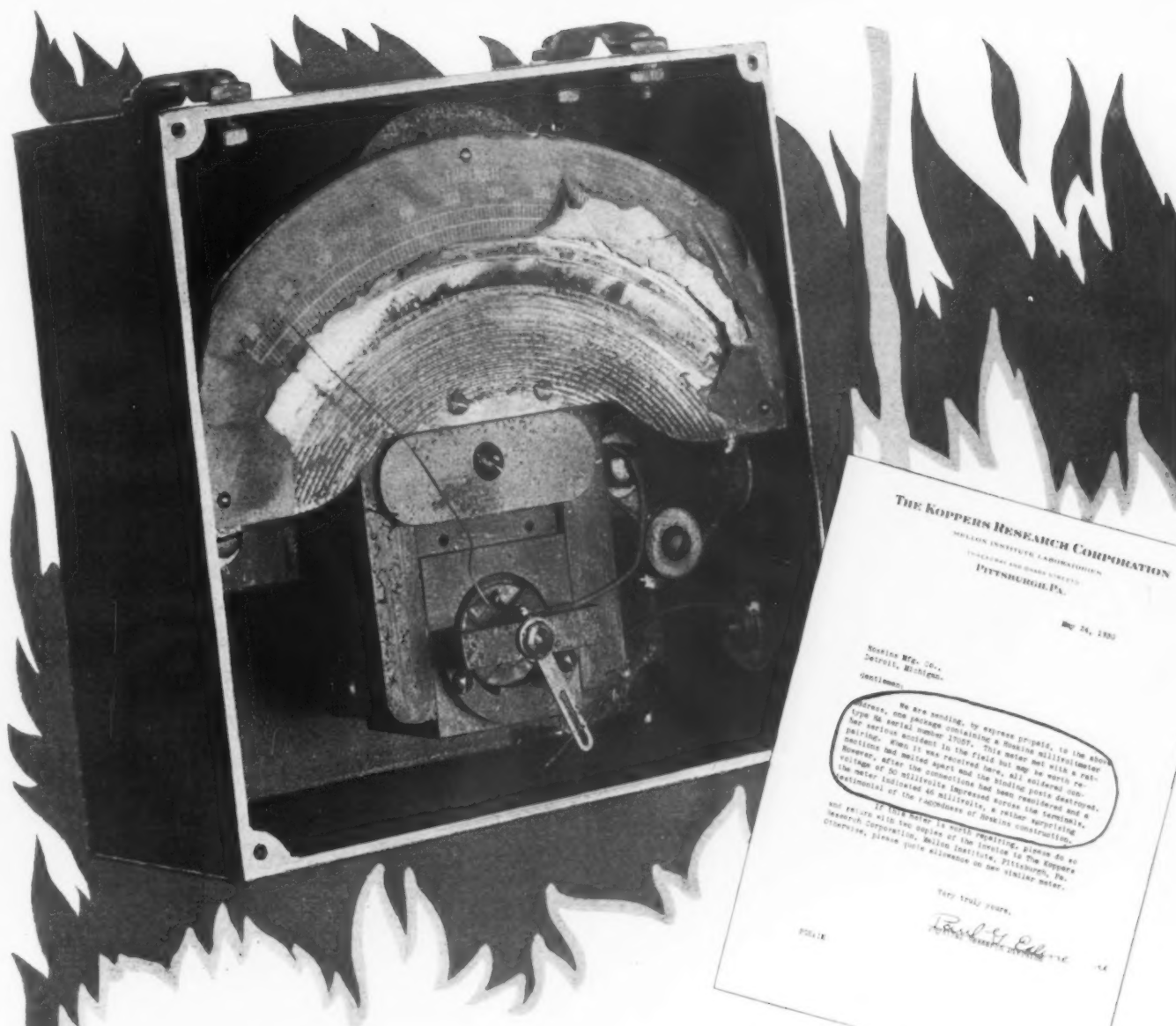
Yoder Co., The.76
York Corrugating Co.147
York Fdry. & Mch. Co.198
Young Bros. Co.177
Youngstown Steel Car Corp.198

Z

Zeh & Hahneemann.68
Zelnicker in St. Louis.195

CLASSIFIED SECTIONS

Clearing House190-195
We Want to Buy196
Contract Work196-199
Business Opportunities199-200
Employment Exchange201-202



THIS illustration and the letter tell the whole story—a true story of the ruggedness of Hoskins Pyrometers. And combined with this ruggedness, is accuracy. Accuracy in the meters themselves, and in the Chromel Couples that operate them. If you are interested in accurate, rugged pyrometer equipment, we invite you to ask for Catalog 52-I.A.

HOSKINS MANUFACTURING COMPANY, 4439 Lawton Avenue, Detroit
In Canada: Walker Metal Products, Ltd., Walkerville, Ont.

Hoskins Pyrometers

Originators and Manufacturers of **Chromel** The most widely used Thermo Couple Alloy



THOSE Steel Makers who are alive to the necessity of producing the highest quality steel are regular users of Ferro Carbon Titanium. Experience has shown them that it can be depended upon to make Good Steel Better.

The Titanium Alloy Manufacturing Co.

Niagara Falls, N. Y., U.S.A.

BRANCH OFFICES

60 JOHN STREET, NEW YORK
OLIVER BUILDING, PITTSBURGH
KEITH BUILDING, CLEVELAND



AGENCIES

Pacific Coast

BALFOUR, GUTHRIE & CO.
San Francisco, Los Angeles,
Portland, Seattle, Tacoma,
Vancouver, B. C.

Great Britain and Europe

T. ROWLANDS & CO., Ltd.
Sheffield, Eng.



And Now—The World's First Anti-Friction Locomotive Timken Bearing Equipped

Another tough job for Timken Bearings—but Timkens are licking it just as they have licked Industry's toughest jobs in all types of machinery!

For the first time in the history of world railroading, a locomotive has been placed on a full anti-friction basis, and Timken is proud to have the privilege of pioneering this great forward step in the interests of American railroad advancement.

The Timken locomotive pictured above was designed and built for the sole purpose of demonstrating the advantages of roller bearings as applied to motive power.

It has been placed in service on a strictly non-revenue basis, and is being loaned without charge to railroad companies desiring to determine its operating characteristics under their own conditions.

Every wheel turns on Timken Tapered Roller Bearings—front truck wheels, driving wheels, trailer truck wheels and tender truck wheels.

There are 32 Timken bearings in the wheels and booster, and in addition Timkens are used in the speed driver of the valve pilot and in the train control governor.

Another revolutionary feature of this locomotive made possible by the higher rotative driving wheel speeds secured through the use of Timken Bearings, is the fact that it can handle fast freight and passenger trains with equal efficiency, having the necessary power and speed for both purposes.

All of the Timken benefits which users of Timken-equipped industrial machinery have enjoyed for years are reflected in the Timken locomotive, namely, friction elimination, lubrication economy, power conservation, radial, thrust and combined load capacity, extended machine life—modern anti-friction necessities that only Timken Bearings can provide. Don't you want these same enduring economies in every piece of equipment you operate? The Timken Roller Bearing Co., Canton, Ohio.

TIMKEN *Tapered* Roller BEARINGS

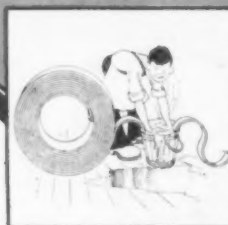
This NEW LEATHER BELTING

Has Greater and More Uniform Adhesive Strength

The constant bending back and forth over the pulleys will not break down the cement. It means a livelier Belt and one that wears longer.



Cement is as Flexible as the Leather Itself



It can be used with perfect safety in wet places because all laps and plies are strictly waterproof. This also is real insurance against accidental wetting.

Absolutely Waterproof



Costs No More

This new and improved Belting costs no more than you formerly paid for our common cemented Belts.

THE laps and plies of the new Graton & Knight Leather Belting are so securely and uniformly cemented that they seem almost to have grown together. This Leather Belting is made by an exclusive process of tension cementing for which a unique type of Belt making machinery (patent applied for) was developed by our own engineers. This modern, scientific process produces Belting that enables you to make real savings because of its many advantages, some of which are: its greater and more uniform adhesion in laps and plies—its greater flexibility—its waterproof qualities—and the fact that it costs you no more than you formerly paid for our common cemented Belting.

Belting users make a substantial reduction in maintenance, operating and production costs by using the new Graton & Knight Leather Belting.

All Belting users are invited to visit our plant at Worcester, Mass., and see in operation the amazing new type of Belt making machinery which is producing this new Leather Belting.

OTHER INDUSTRIAL PRODUCTS

Rubber Transmission, Conveyor
and Elevator Belting
Mechanical Rubber Goods
Lace Leather

Round Belting
Belt Cements and Dressings
Leather Link "V" Belting
Leather Cups

"U" and Flange Packings
Leather and Rubber Washers
and Discs
Hand Leathers

Graton & Knight Company

Worcester, Mass.



This Issue in Brief

Antagonism on the part of workers toward the introduction of an apprentice-training system can be overcome by forming a committee composed of production executives. The workers have confidence in their superiors and in this way prejudice can be dispelled.—Page 979.

* * *

Money can be saved for the steel industry by charging open-hearth slag into the blast furnace rather than throwing it away. The iron it contains, and especially the manganese, give it considerable value.—Page 980.

* * *

Power press crankshaft must be strong, as it is the heart of the press. But it must not be too strong, otherwise it presents the possibility of a broken frame.—Page 982.

* * *

Harmful gas can be removed from molten aluminum alloys by treating with titanium tetrachloride. Grain size is markedly reduced. The best way to introduce the chloride is to saturate dry asbestos wool and place at the bottom of the melt.—Page 985.

* * *

If you want your wire rope to have long life see that it is uncoiled properly. Mount the reel on jacks and pull the rope off as the reel revolves. If coiled, roll the coil along the floor. Never lay the reel or coil on the floor and pull the rope over the side.—Page 986.

* * *

If you have a plant improvement idea, fight for it. Many sound schemes die because their proponents are too modest, afraid of their superiors, or too easily discouraged.—Page 989.

* * *

Slight growth during nitriding can be allowed for in final machining or grinding before nitriding. Or it can be removed afterward by lapping.—Page 991.

When you have electric motor trouble, first determine whether the motor has the proper characteristics for its work. If trouble is still unfound, investigate the driven load, to ascertain if erratic conditions exist.—Page 988.

* * *

Produces cylindrical castings of non-porous metal, uniform texture and hardness, close grained and free from imperfections, in centrifugal casting machine. Navy Yard makes both ferrous and non-ferrous castings. Steel cylinder is lined with sand. Molten metal is poured in through a spout.—Page 994.

* * *

Win sales arguments by doing more listening than talking, professor tells industrial salesmen. Make your points briefly. Look thoughtful, give objections careful consideration. Don't interrupt the prospect.—Page 997.

* * *

Relieves foremen of responsibility of selecting work to be put on a machine by means of production control system. Heart of the system is four control wheels, each with 52 pockets, one pocket for each machine. Card in the pocket tells what the machine is working on.—Page 1002.

* * *

How long will the business recession last? A study of seven recessions and recoveries in steel production reveals that the present recession is the least severe. Average length of recovery was about 15 months, which would make recovery from the present lull come next March.—Page 1009.

* * *

Ruin of many an ambitious employee training plan is due to failure to appreciate that it is harder to maintain a training plan than to start one. Interest lags when novelty wears off. Interest can be stimulated by carefully planned meetings.—Page 1045.

Better steel results from presence of manganese in the pig iron. Manganese in the blast furnace charge permits desulphurizing and increases fluidity. "Bull-dog" silica inclusions are absent.—Page 981.

* * *

To calculate the pressure in tons exerted by a single-crank press, multiply the square of the crankshaft diameter by $3\frac{1}{2}$. This rule is approximately correct except where the stroke of the crankshaft exceeds twice its diameter.—Page 982.

* * *

Unsoundness and blow-holes result from melting light aluminum alloys in a gas-fired furnace, says British metallurgist. But treatment with volatile chlorides removes imperfections. — Page 985.

* * *

Normal operation of your electrical apparatus may be aided by use of synchronous motors at key points. Now non-stalling on undervoltage; adaptable for low-speed drives.—Page 989.

* * *

Before nitriding, be sure to heat treat, to obtain desirable physical properties of the core and to insure proper grain refinement.—Page 991.

* * *

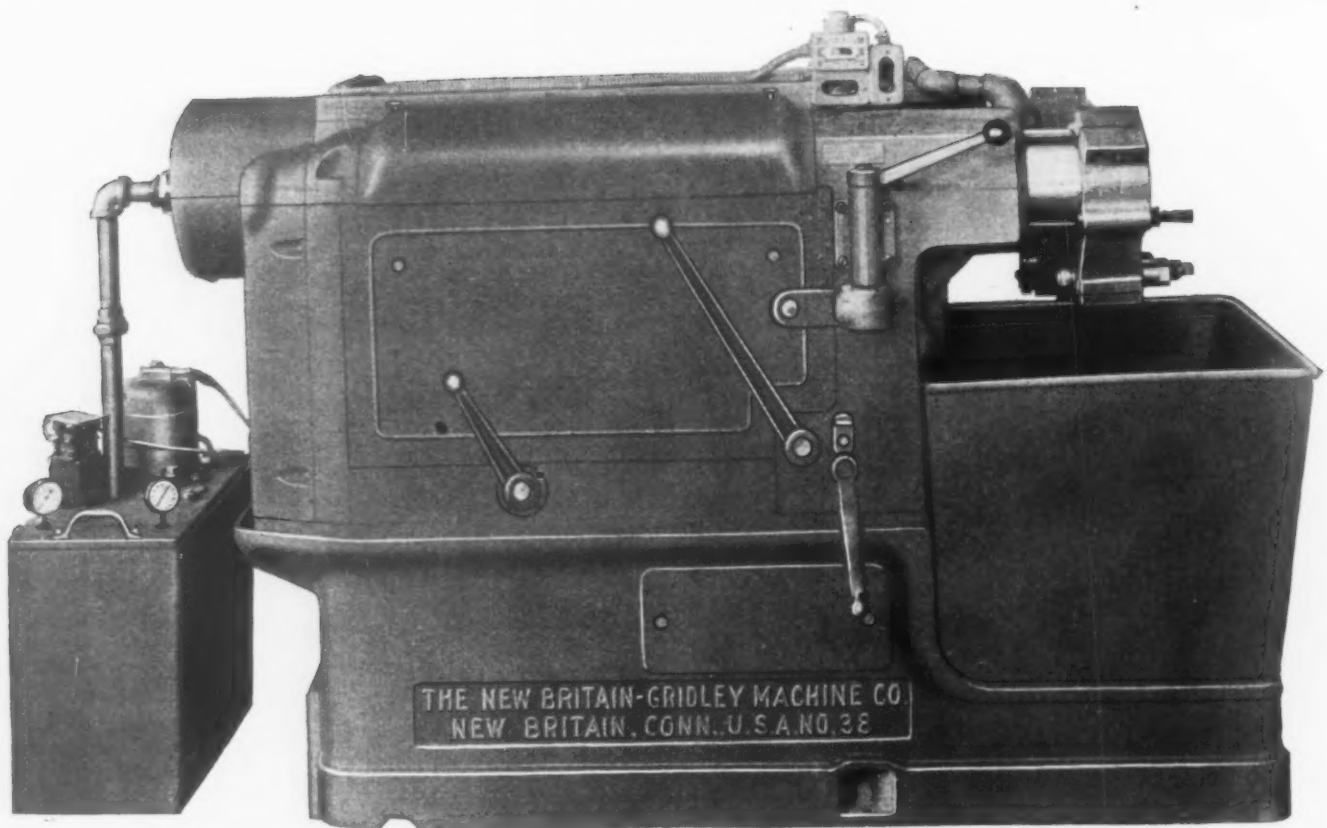
High temperatures decrease nitriding hardness although depth of case increases. For deep case, you can nitride at 1200 deg. F., and again at 950 deg. F. for desired surface hardness.—Page 991.

* * *

Deep drawing dies can be nitrided, but sharp corners must be avoided if good results are to be obtained. Design of the die has much to do with the success of the treatment.—Page 992.

* * *

Uniform nitriding results are obtained by packing the work in magnesia, copper and chips. Type of case obtained is independent of the dissociation of the gas.—Page 993.



NUMBER 38 NEW BRITAIN SINGLE SPINDLE CHUCKING MACHINE

An extremely rigid compact single spindle chucking machine designed to permit both longitudinal and radial cuts with each of the two tool slides regularly furnished.

Massive construction and exceptional supporting qualities of tool slides and tool carrying arms allow conventional feeds to be easily exceeded, without sacrifice to quality of work or satisfactory tool life.

Work is gripped quickly and powerfully, yet without distortion, through patented hydraulically operated chucking unit. 10½" chucks, either internal or external, or special fixtures may be used.

THE NEW BRITAIN-GRIDLEY MACHINE CO.
NEW BRITAIN, CONN.
U. S. A.
